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Food Technology Curricula

This is the ninth of a series of articles which intend to elucidate the basic ideas which govern the curricula of our educational institutions in the field of food technology.

Food Technology at Iowa State College

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Administration of Food Technology as a professional field in the colleges and universities of the United States has taken many forms. Prominent among these are partial or complete departmentalization and administration by committee. The diversity has been due to variation in commodities of interest in particular geographic areas, differences in objectives, differences in technical personnel available for direction of the programs, and in recent years to the rapid increase in emphasis upon graduate training and research.

Since its inception, the Food Technology program at Iowa State College at the graduate level has been administered by a committee. The first of these was composed of representatives from thirteen subject matter fields and included the Director of the Agricultural Experiment Station and the Dean of the Graduate College. This committee was formed primarily to explore the field and to formulate an acceptable program. When the curriculum was in operation, a sub-group was formed for administrative purposes. Earlier programs were departmental and primarily oriented toward the B.S. degree as terminal. Curricula such as Dairy Industry, Food Chemistry, Experimental Cookery, Food and Sanitary Bacteriology were introduced at an early date and continue in the present catalog. To increase the breadth of training, cooperative interdepartmental curricula have also been introduced.

The present committee administering the Food Technology program consists of the Associate Director of the Iowa Agricultural Experiment Station as chairman, the Dean of the Graduate College, and five staff members representing Dairy Industry, Chemistry, Bacteriology, Foods and Nutrition, Animal Husbandry and Horticulture. The committee members were selected because of their interest and ability to contribute to the program in addition to departmental affiliation.

The profession of Food Technology, by its nature, demands a cooperative arrangement for its operation as a curriculum. This situation derives primarily from the fact that the elemental building blocks are found in basic, intermediate and applied scientific fields. Efforts to integrate these segments into a unified program too often have resulted in duplication of personnel, equipment, and effort which might have been avoided by a truly cooperative program.

Cooperative administration of the Food Technology program provides latitude both in research and teaching which facilitates the training of students for work in several important parts of the food industry. Where departmentalization often emphasizes one phase of the food field, cooperative administration allows for considerable variation based on the needs of individual students. By this means, special emphasis may be placed on chemistry, bacteriology, engineering, statistics, meat, vegetable, poultry or other technologies by incorporating these requirements into the basic curriculum. It has been found at Iowa State College that this approach encourages a high degree of cooperation among the various departments and allows more efficient use of facilities than would otherwise be possible.

The undergraduate curriculum at Iowa State College, in common with many others leading to the Bachelor of Science degree, includes Mathematics through differential and integral calculus; general, qualitative and quantitative chemistry; a year each of biology, physics, physical chemistry, organic chemistry, chemical engineering, English composition, German; several advanced courses in chemical analysis; and several additional courses in botany and zoology to complete the formal course requirements. In addition, three months of practical experience in the food industry of a type approved by the Administrative Committee is required prior to graduation.

At the graduate level, both the Master of Science and Doctor of Philosophy degrees are offered in Food Technology. The program for each student is built around the fundamental sciences, mathematics, chemistry and physics which form the basic requirements of the program. Requirements in other sciences as bacteriology, botany, chemical engineering, statistics and economics are varied to meet the needs of the student. Finally, course work is completed in one of the applied fields such as Animal Industry, Dairy Industry, Foods and Nutrition, Horticulture or Poultry Industry to prepare the student for a position in one of the commodity or other segments of the food field.

The committee in charge of the candidate's program generally requires courses in food bacteriology, diagnostic bacteriology, a series of courses in biochemistry or in physiological chemistry and one additional course in organic analysis. Training in statistics is required and usually includes two or more quarters of applied statistics. Courses in cooperating departments which are acceptable for credit in the Food Technology program and optional for specialization, are specifically designated in the catalog. These courses, along with a two quarter sequence in Food Technology offered jointly by the Chemistry and Bacteriology departments are used to round out the student's program in his field of major interest and to provide orientation.

Research requirements for advanced degrees are similar to those of other accredited institutions. Much of the research work which is applied toward advanced degrees, however, is the result of the direct application of basic scientific principles in an effort to improve processes and products in some part of the food industry. A close connection is maintained with the food industries of the state.

The Effects of Sweetened and Unsweetened Foods on Aluminum Cooking Utensils

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(Manuscript received June 28, 1951)

The corrosive effects of acid foods, with and without added sugar, were determined on aluminum cooking utensils. The addition of sugar to acid foods causes a sparing effect on the corrosion of aluminum.

In a previous study *(3)* of the effects of acid foods on the corrosion of aluminum, it was indicated that sugar exercised some sparing effects. Definite conclusions could not be drawn, however, from the study because the sweetened and unsweetened acid foods were from different sources. In the present study, the effects of the same fruit juices, sweetened and unsweetened, were tried on different brands of aluminum cooking utensils.

METHODS AND PROCEDURE

All of the fruit juices used in this research were unsweetened canned juices, with the exception of fresh cherry juice. The aluminum utensils employed were standard stock varieties and were furnished by different manufacturers. Five of the utensils were made from wrought aluminum and three were made from cast aluminum. Aluminum used to make cooking utensils usually contains from 97 to 99% aluminum. Such elements as copper, silicon, magnesium, iron, and zinc sometimes are present in a few tenths percent each. Manganese may be present in amounts up to 1.0%*.

The required amount of juice was measured into each utensil and heated to the boiling point over an open flame. The covered pans were then transferred to a steam bath, and the contents were allowed to simmer for exactly one-half hour. The original volume was restored by the addition of distilled water, and the cooked juices were placed in stoppered flasks and stored in the ice box until analyzed. With grapefruit juice, separate tests were made with the pure juice; juice containing 5%, 10%, and 20% sucrose; and with juice containing 10% glucose. With all subsequent juices, tests were made only with the original juices and with the same juices containing 10% added sucrose.

An aliquot of each cooked juice was then carefully measured into platinum dishes, evaporated to dryness on a steam bath, charred, and ashed in the electric furnace at a temperature of 650° C. The ash was analyzed for aluminum.

Aluminum was determined gravimetrically by precipitation with o-hydroxyquinoline, or oxine, as it is commonly called. Since iron, which is a natural constituent of most fruit juices, is wholly precipitated by oxine; and since manganese, of which small percentages are alloyed with aluminum in the fabrication of the utensil, is partially precipitated by the reagent, it was necessary to remove these elements before adding the precipitating reagent. Several methods of separating the interfering substances from the aluminum were attempted, but precipitation as the sulfides proved to be the most satisfactory. The aluminum was kept from precipitating as the hydroxide in this operation by the addition of tartaric acid which formed a compound with the aluminum similar to the copper compound formed with Fehling's solution.

Lundell, Hoffman, and Bright *(2)* outline both of Berg's original methods for precipitating aluminum with o-hydroxyquinoline. It was found by experimentation, however, that neither of Berg's two methods could be used under the conditions of this research without modification. When the first method was attempted, the addition of the buffer solution failed to raise the pH high enough for complete precipitation because of the secondary buffering action of the ammonium tartrate that had been formed by the addition of tartaric acid just prior to the removal of iron as iron sulfide. Because of the influence of this double buffer, even the addition of relatively large amounts of base failed to raise greatly the pH value of the solution. The second method could not be used, since in basic solutions the calcium, which is normally present in relatively large amounts in most fruit juices (400 p.p.m. in orange juice), was partially precipitated by the reagent. A modification, therefore, of Berg's methods was devised.

A careful check with the potentiometer revealed that in the presence of tartaric acid the precipitation of aluminum by oxine was complete at a pH value of 7.3 when no buffer was used. Fortunately calcium, at a concentration of 400 p.p.m. did not precipitate immediately at a pH value of less than 9. In solutions just basic to phenolphthalein, no calcium precipitated within one hour after the addition of the reagent. At the end of two hours, however, appreciable quantities of the precipitate had appeared. Care was taken, therefore, in all determinations of aluminum by this modified method to have the filtration complete within one hour after precipitation.

It was found that much time could be saved by using Universal Indicator Paper rather than the potentiometer in adjusting the pH value of the solutions before the precipitation of the aluminum by oxine. Since any pH value between 7.3 and that at which phenolphthalein turns pink was satisfactory, it was felt that this indicator was sufficiently accurate.

Several tests were made for the purpose of determining how much of the oxine reagent should be used for each determination. The reagent was prepared by dissolving a sufficient quantity of finely powdered o-hydroxyquinoline in 2*N*. acetic acid to make a 5% solution. One ml. of this solution would precipitate 2.7 mg. of aluminum. The test revealed that 2 ml. of the reagent could be added to 100 ml. of distilled water at 60° C. without any of the reagent precipitating, but that 3 ml. caused precipitation to take place. Therefore, in all of the determinations of aluminum at least 2 ml. of the reagent were used. If the resulting filtrates were not strongly yellow, slightly more reagent was used. Tests for complete precipitations were made frequently.

The details of the modifications of the oxine method used for determining aluminum in this research are as follows:

a. Add phenolphthalein to the filtrate from the iron sulfide separation.

b. In order not to precipitate milk of sulfur, add concentrated sulfuric acid slowly until the pink color disappears. The pH value at this point should still be definitely on the basic side. The solution should turn the indicator paper green, showing a pH value of around 8.

c. Heat the solution to around 60° C.

d. Add from 2 to 2.5 ml. of the oxine reagent per 100 ml. of solution.

e. Again check the pH value with indicator paper. If too low, add concentrated ammonium hydroxide until a pH value of 8 is reached.

f. Digest on a hot plate at around 60° C. until the precipitate coagulates.

g. Thoroughly cool in an ice bath.

h. Within one hour after addition of reagent, filter through a weighed Gooch crucible.

i. Wash the precipitate with water containing 5 ml. of reagent and 5 ml. of ammonium hydroxide per 100 ml. and finally with a small amount of distilled water.

j. Dry the precipitate at 120° C. for several hours and weigh as aluminum quinolate. The precipitate contains 5.85% aluminum by weight.

Care should be taken not to use too much water in washing the precipitate, as it is slightly soluble. For this reason, fresh crucible pads should be used for each determination.

* Personal communication, Aluminum Company of America.

TABLE 1

Aluminum dissolved by grapefruit juice containing different amounts of sugar

Sucrose %	Spun aluminum utensils						Die-cast aluminum utensils			
	1[b]	2	3	4	5	Average	6	7	8	Average
	p.p.m.	*p.p.m.*	*p.p.m.*	*p.p.m.*	*p.p.m.*	*p.p.m.*	*p.p.m.*	*p.p.m.*	*p.p.m.*	*p.p.m.*
0	39.0	23.0	15.6	17.1	20.0	22.9	45.0	57.0	72.0	58.0
5	32.0	20.0	12.7	16.6	17.0	19.7	43.3	52.3	48.3	48.0
10	18.2	15.3	4.8	16.0	15.4	13.9	41.0	43.2	31.0	38.4
20	12.0	13.4	3.3	15.6	13.7	11.6	39.4	29.4	28.0	32.3
10[c]	15.5	11.3	6.3	16.5	14.1	12.7	43.5	39.5	39.8	40.9

[b] Numbers refer to brands of aluminum utensils.
[c] Glucose.

TABLE 2

Aluminum dissolved by sweetened and unsweetened fruit juices

Kind of juice	Spun aluminum utensils						Die-cast aluminum utensils			
	1[d]	2	3	4	5	Average	6	7	8	Average
	p.p.m.	*p.p.m.*	*p.p.m.*	*p.p.m.*	*p.p.m.*	*p.p.m.*	*p.p.m.*	*p.p.m.*	*p.p.m.*	*p.p.m.*
Unsweetened grapefruit	39.0	23.0	15.6	17.1	20.0	22.9	45.0	57.0	72.0	58.0
Sweetened grapefruit	18.2	15.3	4.8	16.0	15.4	13.9	41.0	43.2	31.0	38.4
Unsweetened pineapple	12.2	17.9	12.5	13.3	15.8	14.3	14.0	20.5	29.5	21.3
Sweetened pineapple	8.4	8.3	7.9	9.6	13.5	9.5	9.9	17.6	15.4	14.3
Unsweetened tomato	15.3	18.2	20.2	20.5	6.1	16.1	32.7	24.6	17.6	25.0
Sweetened tomato	7.6	1.2	18.3	6.4	4.6	7.6	29.2	20.0	13.4	20.9
Unsweetened orange	41.5	37.2	29.8	34.2	45.0	37.6	34.8	45.0	51.5	43.8
Sweetened orange	23.6	12.1	26.3	18.7	26.3	21.4	29.3	40.5	30.1	33.3
Unsweetened cherry	33.4	53.8	51.0	54.8	51.6	48.9	72.8	83.7	79.6	78.7
Sweetened cherry	28.2	20.5	29.1	51.5	25.3	30.9	70.4	80.6	74.8	75.3
Unsweetened prune	14.7	18.0	15.1	31.8	10.6	18.0	13.5	23.9	23.1	20.2
Sweetened prune	1.2	0.4	3.3	11.8	8.8	5.1	3.7	10.1	11.4	8.4
Unsweetened pear	12.6	17.4	7.2	1.3	10.3	9.8	32.0	30.2	18.4	26.9
Sweetened pear	7.8	12.0	0.1	0.0	2.6	4.5	19.2	14.6	15.4	16.4
Averages										
Unsweetened juices	24.1	26.5	21.6	24.7	22.8	23.9	35.0	40.7	41.7	39.1
Sweetened juices	13.6	10.0	12.8	16.3	13.8	13.3	29.0	32.4	27.4	29.6

[d] Numbers refer to different brands of aluminum utensils.

EXPERIMENTAL RESULTS

The first set of experiments consisted of determining the effects of added sucrose and glucose on the corrosive effects of the fruit juices on aluminum utensils. The results of these experiments are given in Table 1. The amount of aluminum dissolved from the utensils by the grapefruit juice varied inversely with the amount of sugar in the juice. About one-half as much aluminum was dissolved with juice containing 20% sucrose as with the original juice. Sucrose and glucose showed approximately the same retarding effects. The sugar had less sparing action on the cast aluminum utensils than on the wrought aluminum.

In Table 2 are shown the results of the effect of corrosion by the original juices and those containing 10% of added sucrose. In each instance the sweetened juice dissolves much less aluminum from the utensils than does the unsweetened juice. This condition has been noted by Beal, Unangst, Wigman, Cox *(1)*, and Poe and Leberman *(3)*. With the unsweetened juices, the average amount of aluminum dissolved in the wrought aluminum utensils was 23.9 p.p.m. and in the cast-aluminum utensils 39.1 p.p.m. With the sweetened juices, the wrought aluminum utensils showed 13.3 and the cast utensils 29.6 p.p.m. aluminum. The reduction in the amount of aluminum dissolved caused by the presence of sugar averaged 44% with wrought aluminum utensils and 24% with cast aluminum utensils. There was little uniformity in the action of a given juice on the different individual utensils.

In all instances where sugar had been added to the juices, the analytical results were corrected to eliminate the diluting effect of the sugar, so the "p.p.m." referred to in the tables are amount of aluminum in the pure juice.

A study of the tables shows that the addition of sugar to fruit juice has a sparing effect on the corrosion of aluminum. In order to determine whether or not the corrosive effect had any relationship to the amount of acid present, titrations were made for acidity on each juice. In Table 3 are shown the relative acidities of the fruit juices used in terms of ml. of 0./*N*. NaOH required to neutralize the acids in 100 g. of juice. The percentage of acid in the juices calculated as malic acid is also given. The effect of some dilute acids on aluminum utensils has been reported from this laboratory *(4)*.

TABLE 3

Acidity of unsweetened fruit juices

Juice	NaOH required for 100 g. of juice	Acidity as malic acid
	ml.	%
Cherry	260.7	1.72
Grapefruit	239.8	1.61
Orange	184.8	1.24
Pineapple	130.9	0.88
Prune	82.5	0.55
Tomato	70.4	0.47
Pear	62.7	0.42

The most acid juices were cherry, grapefruit, and orange. The least acid were pear, tomato, and prune juices. The most acid juice, cherry, dissolved the greatest amount of aluminum from the utensils and the least acid juice, pear, dissolved the least amount of aluminum. Acidity, therefore, seems to be one important factor in the reactions of fruit juices on aluminum utensils.

CONCLUSIONS

1. The acid fruit juices tested show a slight corrosive action on the aluminum utensils.

2. The acidity of the juice and the corrosive effect show a definite relationship.

3. Unsweetened juices dissolve more metal from utensils than do sweetened juices. The corrosive effect of sweetened juices decreases as the concentration of sugar increases.

4. The fruit juices had a greater corrosive effect on the cast than on the wrought aluminum utensils.

5. A modification of the oxine method for the determination of aluminum is proposed.

6. The amounts of aluminum dissolved are not believed to be great enough to be of concern from the health standpoint.

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Studies on Round Fish Frozen at Sea, New England Species[a]

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Fillets from round-frozen thawed fish are compared with fillets from iced fish as to percent drip, salt content, trimethylamine content, keeping quality, and yield.

Freezing fish at sea as a means of preserving freshness throughout extended trawler voyages necessitated by the apparent scarcity of certain species of fish and the consequent greater effort and time required to bring in a payload has aroused considerable interest in the fishery industries of New England. In view of this interest, experimental freezing studies were initiated by the Fish and Wildlife Service during the latter months of 1948 aboard the Albatross III in conjunction with survey studies of the major fishing grounds off the New England coast. The development of more successful methods of fish preservation aboard vessels other than icing is of extreme importance in view of the wide variance in quality of fish brought into port and the subsequent losses resulting from the less desirable fish. Freezing fish at sea is not entirely a new procedure and is practiced in some areas with success, particularly on West Coast species such as tuna.

Preserving fish aboard vessels by freezing for later defrosting, processing, and refreezing ashore is contrary to the rather widespread popular belief that once fish is frozen it should never be refrozen. This belief is no doubt a result of experience gained in refreezing fish that are not in strictly prime condition at the time of initial freezing. It is believed that the ability of fish flesh to withstand the process of freezing, thawing, and subsequent refreezing is in large measure governed by the condition or freshness of the fish at the time of the initial freezing.

Notevarp and Heen *(2)*, in work carried out abroad, confirmed this belief to some extent when they concluded, among other things, that the process of freezing as most generally used in America and Europe whereby the fish are kept in ice up to 10 days before freezing cannot yield the best quality of fish. Later it was pointed out *(3)* that the freshness of the raw material has a considerable influence on the quality after freezing and the keeping qualities in storage.

EXPERIMENTAL

The fish used in the studies reported herein were taken in the census trawls of the Albatross III. They included haddock, cod, redfish, pollock, and hake. Quantities of fish caught in the census trawls were much smaller than usual commercial catches, consequently each lot of fish studied weighed only 100 to 150 pounds. All samples of fish were prepared for freezing or icing within two hours after being brought on deck.

Samples of fish for freezing were "in the round" (not eviscerated). The fish were washed in circulating sea water prior to freezing. Freezing was accomplished in a multi-coil still air room capable of mintaining —20° F. (—29° C.) with the temperature rising to no higher than —10° F. (—23° C.) with a full load. The fish were laid flat on galvanized iron pans spread nine inches apart in the lower two-thirds of the freezer room for as effective use as possible of thermal currents. The fish were allowed to freeze solid and were not removed from the pans until after eight hours in the freezer.

After freezing, the fish were stored in boxes at 0° F. (—18° C.) for the remainder of the voyage. Since the trips were of relatively short duration (5 to 10 days) glazing of the fish previous to storage was not considered necessary. For comparison, similar species of fish of the same size and lot were stored in ice. These fish were eviscerated and washed previous to storage in ice. Since relatively small quantities of fish were caught, those fish stored in ice were not subjected to as much pressure in the pens as fish handled under commercial conditions.

Upon arrival at port, fish frozen in the round were thawed in circulating chlorinated (5 p.p.m. residual chlorine) sea water at 50° to 55° F. (10° to 13° C.) for approximately three hours.

[a] Presented at the Eleventh Annual Meeting of the IFT, New York, N. Y., June 19, 1951.

Thereafter, the round fish and iced fish were handled in accordance with existing commercial practice for filleting and brining.[b]

The fillets were wrapped individually in cellophane, placed in five-pound waxed cartons and frozen in a multiplate freezer at −30° F. (−34° C.). After freezing, the packaged fillets were placed in master cartons for storage at 0° F. Samples were withdrawn for examination at monthly intervals.

A series of physical, chemical, and organoleptic tests were used to detect differences that might exist between fillets prepared from frozen-round-thawed and iced fish.

DISCUSSION OF PROCEDURES AND RESULTS

Yield of fillets. During the course of filleting operations, records were kept of the percentage yield of fillets from the frozen-round-thawed fish and iced fish. The thawed round fish were not gutted prior to filleting. In order to place fillet yields on a comparable basis, 15% of the total round weight was allowed as the weight of the viscera. This figure is generally used throughout the industry as the average allowance for viscera of the various New England species. Actual weight of viscera from several hundred pounds of fish of different species, in later work, ranged from 11 to 22%. The liver portion of the viscera ranged from 1.3 to 3.1% of the round fish weight or 12 to 32% of the viscera weight.

Inasmuch as the experimentally iced dressed fish, used in this study, were not subjected to the same rigorous conditions of handling as commercially iced fish, fillet yield data for commercially iced fish were secured from seven processing plants in New England for further comparison. Fillet yield data for frozen-round-thawed, experimentally iced dressed, and commercially iced dressed fish are shown in Table 1.

TABLE 1

Yield of fillets from round-frozen-thawed, experimentally iced, and commercially iced fish

Species and market class of fish	Type of fillet	Fillet yield		Commercially iced [c]
		Round-frozen thawed [b]	Experimentally iced	
		%	%	%
Pollock, large	skin on	48.1	.....	40-44
Pollock	skin on	47.5	47.1	32-42
Redfish	skin on	28.3 [d]	.....	25-28
Cod, whale	skinless	48.5	44.4	35-40
Pollock, market	skin on, nape on	55.1	53.6	48-51
Hake, market	skinless	50.7	48.1	42-43.5

[b] Converted to iced fish basis allowing 15% for viscera.
[c] Range of fillet yields from seven New England plants.
[d] Allowance for viscera not made since redfish are not eviscerated commercially.

These preliminary data indicate that percentage yield of fillets from round-frozen-thawed fish of the species studied is somewhat higher than that for experimentally iced and commercially iced fish, varying in accordance with the species and size of fish.

It was observed that fish frozen in the round retained the physical characteristics of rigor mortis after thawing; also, the experimentally iced fish were somewhat firmer than most commercially iced fish. This would seem to further indicate that a greater yield of fillets would result from firm-fleshed fish because of the greater ease in filleting firm fish.

Trimethylamine (TMA) content of round-frozen-thawed and experimentally iced fish. The trimethylamine (TMA) content of fillets from round-frozen-thawed and iced dressed fish was determined at monthly intervals over a period of seven months of commercial cold storage (0° F.). The method outlined by Dyer *(1)* was used. This test is widely used for certain species of fish as a means of determining adverse bacterial action and the extent of this activity through the reduction of trimethyloxyamine, a natural component of fish, to TMA, the component responsible for the "fishy" odor in chilled fish. As the TMA content rises, the more intense is the "fishy" odor.

The TMA content of packaged fillets, prepared from various species of round-frozen-thawed, experimentally iced dressed, and commercially iced dressed fish after commercial cold storage for periods up to seven months is shown in Table 2.

TABLE 2

Trimethylamine (TMA) content of frozen fillets prepared from various species of round-frozen-thawed, experimentally iced, and commercially iced fish

Species of fish	Treatment prior to filleting	Trimethylamine in mg. per 100 g. of fillet							
		Months in commercial cold storage (0° F.)							Mean TMA value for 7 months storage period
		1	2	3	4	5	6	7	
Haddock	Round-frozen thawed	0.5	0.5	0.5	0.3	0.4	0.2	0.2	0.4
	Bled, round frozen, thawed	0.5	0.5	0.5	0.3	0.4	0.2	0.3	0.4
	Experimentally iced for 6 days	0.8	0.9	0.9	0.4	0.8	0.4	0.6	0.7
Cod	Round-frozen thawed	0.5	0.4	0.8	1.4	1.4	1.3	0.8	0.9
	Experimentally iced for 10 days	5.9	4.3	2.2	4.4	4.6	4.9	4.9	4.5
Pollock	Round-frozen thawed	1.1	2.8	1.3	1.3	1.1	1.1	....	1.5
	Experimentally iced for 10 days	11.7	5.9	7.0	9.6	5.6	6.6	....	7.7
Hake	Round-frozen thawed	2.6	6.6	4.3	2.4	2.2	2.8	3.0	3.4
	Experimentally iced for 10 days	10.0	8.7	17.2	8.8	11.2	6.9	5.6	9.8
Redfish	Round-frozen thawed	0.3	0.3	0.2	0.0	0.1	....	....	0.2
	Commercially iced for 10 days	6.8	7.0	6.9	3.5	2.2	....	....	5.3

The TMA values of round-frozen-thawed fillets of all species of fish studied were lower than those of fillets prepared from experimentally iced or commercially iced fish. In the case of haddock, all values were low and the differences not too significant. Low values for the experimentally iced haddock may possibly be accounted for by the difference in age of the fish (6 days) over iced fish of the other species (10 days).

[b] Grateful acknowledgment is made to the General Seafoods Corporation, Boston, Massachusetts, for cooperation in this part of the study.

TMA values of fillets prepared from experimentally iced fish were from two to five times greater than the values of fillets from round-frozen-thawed fish, depending on species. The "fishy" odor was particularly noticeable in the fillets of hake, pollock, and redfish prepared from iced fish. Fillets from round-frozen-thawed fish retained their fresh fish odor throughout the storage period. Fillets prepared from round-frozen-thawed hake had TMA values somewhat higher than others; however, the odor was that of good fresh fish.

It will be noted that the TMA values of fillets from experimentally iced fish showed a tendency to reach a peak after 3 to 4 months of storage at 0° F., subsequently followed by a general decline. Values of samples from fillets prepared from round-frozen-thawed fish, although low, followed a similar trend. The bacterial enzymes capable of reducing trimethylamine oxide to TMA were probably retarded by the low storage temperature 0° F.) after three to four months and the trimethylamine already present after that time slowly volatilized and was lost.

Free drip. Drip measurements were made at monthly intervals on thawed samples of frozen fillets from round-frozen-thawed, experimentally iced, and commercially iced fish of the various species under test. Fillets were thawed for a period of three hours at room temperature on a ½ inch mesh wire screen enclosed in an air tight rectangular metal container. A tightly covered container was used in order to reduce drying by the warm room air. Differences in weight between the frozen and thawed samples were noted and calculated as the free moisture loss or drip.

As will be seen from Table 3, there is a tendency for the drip of fillets prepared from experimentally iced and commercially iced fish to be slightly higher over a 7 month storage period than the drip of fillets prepared from fish frozen in the round. In later experiments it is planned to determine the amount of expressible or press drip present in addition to the free drip for further information on this point.

TABLE 3

Free drip of frozen fillets prepared from round-frozen-thawed, experimentally iced, and commercially iced fish

Species of fish	Treatment on vessel	Percent drip							
		Months in commercial storage at 0° F.							Mean value for 7 months storage period
		1	2	3	4	5	6	7	
Haddock	Round-frozen	0.2	1.1	0.8	1.8	2.2	1.6	1.1	1.3
	Bled, round-frozen	0.2	1.1	0.9	0.6	1.3	1.0	1.1	0.9
	Experimentally gutted, iced for 6 days	0.6	1.2	1.3	1.4	1.8	1.7	1.3	1.3
Redfish	Round-frozen	0.3	0.7	0.6	1.8	1.8	....	....	1.0
	Commercially iced for 10 days	0.9	1.3	1.1	2.0	3.7	....	....	1.8
Cod	Round-frozen	0.4	0.6	1.2	2.4	2.1	1.0	2.0	1.4
	Experimentally gutted, iced for 10 days	1.1	1.1	1.5	1.5	2.2	1.9	3.1	1.8
Hake	Round-frozen	1.3	0.9	3.5	1.7	1.1	0.8	1.6	1.5
	Experimentally gutted, headed, and iced for 10 days	2.1	1.8	3.4	2.2	1.8	1.4	4.0	2.4
Pollock	Round-frozen	0.6	1.2	1.8	2.7	1.1	1.9	....	1.5
	Experimentally gutted, gilled, and iced for 10 days	1.0	1.1	1.4	1.6	1.5	2.1	....	1.5

It was noted after 5 to 6 months of cold storage that some of the fillet samples showed signs of desiccation. This may account in part for the variance in drip values for some of the fillets under study.

Organoleptic tests. Throughout the storage period fillets prepared from the various species of fish under study were judged at monthly intervals for differences in appearance and taste by a qualified taste panel composed of members from the laboratory and selected experts from the industry. The appearance of the thawed and cooked fillets was considered in terms of color, firmness, and wetness, and taste was evaluated by the flavor and texture characteristics of the samples.

In all instances throughout the period of the test, the fillets from round-frozen-thawed fish were judged to be more acceptable from the standpoint of being pleasing, fresh, and having a "sea salt" flavor without the undesirable fishy after-taste associated with fillets from iced fish.

The firm texture of fillets from fish frozen at sea in contrast to the sometimes mushy texture of fillets prepared from iced fish was also considered a significant difference. The color of the fillets from fish frozen in the round remained "bright and life-like" whereas fillets prepared from experimentally and commercially iced fish were dull and bleached out. Additional work on differences in color, taste, and texture under carefully controlled conditions is planned in order to further develop the findings of this preliminary study.

Bleeding fish prior to freezing. Blood in the round fish frozen at sea had been considered as a possible factor in discoloring fillets after thawing. Accordingly, a sample lot of scrod haddock was bled prior to freezing. Fillets prepared from this sample appeared no different than the fillets prepared from unbled haddock frozen in the round. Although this observation indicates that blood may not be a factor of importance in the coloration of fish fillets prepared from unbled round frozen fish, additional experiments are planned on the relationship of bleeding to storage life and palatability of fish fillets. It is probable that fish which have been iced have lost color because of the pressure and bleaching action of the ice when in storage aboard the vessels.

Salt content of fillets. In view of the "sea salt" flavor noted in fillets prepared from round-frozen-thawed fish, a series of salt determinations (Table 4) according to A.O.A.C. methods for fish were carried out on the fillets under study. The salt content (chloride expressed as NaCl) of fillets prepared from fish frozen in the round was greater than that of fillets from experimentally iced and commercially iced fish. Since all samples of fillets were brined in identical solutions for the same period of time when being prepared, it is conceivable that the lower salt content of iced fish is due in part to the leaching out of the salt in the flesh by melting ice. There is also the possibility that the flesh of fish frozen in the

TABLE 4

Salt content of fillets prepared from round-frozen-thawed, experimentally iced, and commercially iced fish

Species of fish	Treatment of fish on vessel	Chlorides as sodium chloride in percent						
		Months in commercial storage at 0° F. 2	3	4	5	6	7	Mean value
Haddock	Round frozen	.....	0.86	0.84	0.86	0.92	0.86	0.87
	Bled round frozen	.....	0.68	1.09	1.14	1.07	1.02	1.00
	Experimentally gutted and iced for 6 days	.....	0.83	0.78	0.96	0.79	0.92	0.86
Redfish	Round frozen	.....	0.86	0.71	0.82	.....	.....	0.80
	Commercially iced round for 10 days	.....	0.57	0.54	0.53	.....	.....	0.55
Cod	Round frozen	0.63	0.67	0.61	0.79	0.68	0.58	0.66
	Experimentally gutted and iced for 10 days	0.38	0.42	0.57	0.50	0.51	0.61	0.50
Hake	Round frozen	0.69	0.76	0.74	0.75	0.73	1.03	0.78
	Experimentally gutted, headed and iced for 10 days	0.46	0.65	0.50	0.63	0.55	0.59	0.56
Pollock	Round frozen	0.63	0.74	0.78	0.68	0.65	.....	0.70
	Experimentally gutted, gilled and iced for 10 days	0.44	0.58	0.44	0.60	0.49	.....	0.51

round absorbed more brine than the flesh of fish iced. The higher salt content was not considered objectionable from the flavor standpoint.

Effect of prolonged commercial storage of round frozen fish prior to thawing, filleting, and refreezing. It is well known that fish held in commercial cold storage 0° F. (—18° C.) for prolonged periods undergo certain physical changes that result in toughening of the flesh and increased moisture losses (drip) on thawing. In view of this it was felt that consideration be given to the length of time fish frozen in the round could be safely held at commercial storage temperatures, prior to defrosting and filleting, before adverse physical changes occurred in the refrozen fillet on further storage. Accordingly, samples of haddock and redfish were frozen in the round at sea, glazed and stored at 0° F. for 10 weeks before thawing, filleting, and refreezing. Fillets from these round-frozen-thawed fish were packaged as described earlier and were compared with fillets prepared from haddock and redfish iced for 10 days after intervals of 1, 4 and 5 months in commercial cold storage.

The TMA, free drip, and salt content of the samples under test appear in Table 5. It will be noted that the TMA values for haddock fillets prepared from round-frozen fish stored for 10 days and 10 weeks are extremely low and vary but little. This is also true for fillets prepared from experimentally iced haddock kept in ice for six days. Likewise the TMA content of redfish fillets was low for fish stored for similar periods prior to thawing, filleting, and refreezing. It was noted that the flavor characteristics of the fillets under test were not altered.

The free drip of fillets prepared from ten weeks old round-frozen-thawed fish increased significantly over that from fillets prepared from ten day old frozen fish. For this reason, at least, fish frozen in the round should not be held for excessive periods in cold storage prior to thawing and filleting.

The salt content of fillets prepared from the fish held in frozen storage for 10 weeks before thawing and refreezing was also lower indicating that the tissue lost some of its ability to absorb brine after the round frozen fish were thawed for filleting and subsequent brining.

The limited data indicate that prolonged storage of round frozen fish has an effect on the physical characteristics of the refrozen fillets and commercial cold storage of the round fish should, therefore, be limited to a period not exceeding ten weeks prior to thawing and filleting.

CONCLUSION

These studies in general indicate that frozen fillets prepared from round-frozen-thawed fish are as good as or better in quality than fillets prepared from experimentally iced and, in the case of redfish, commercially iced fish. Larger scale experiments to test commercial application of freezing round fish at sea are planned.

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TABLE 5

Trimethylamine (TMA), free drip, and salt content of stored frozen fillets prepared from round frozen thawed fish after ten days and ten weeks commercial cold storage as compared to fillets from iced fish

Species	Treatment	Months in storage at 0° C.								
		1	4	5	1	4	5	1	4	5
		TMA, mg./100 g.			*Drip, %*			*NaCl, %*		
Haddock	Round frozen, stored 10 days, defrosted, filleted	0.5	0.3	0.4	0.2	1.8	2.2	.....	0.84	0.86
Haddock	Round frozen, stored 10 weeks, defrosted, filleted	0.3	0.2	0.1	2.3	5.2	4.1	0.76	0.56	0.57
Haddock	Experimentally iced, 6 days, filleted	0.8	0.4	0.8	0.6	1.4	1.8	.....	0.78	0.96
Redfish	Round frozen, stored 10 days, defrosted, filleted	0.3	0.0	0.1	0.3	1.8	1.8	.....	0.71	0.82
Redfish	Round frozen, stored 10 weeks, defrosted, filleted	0.1	0.1	0.2	2.3	3.6	3.3	0.49	0.57	0.59
Redfish	Commercially iced, 10 days, filleted	6.8	3.5	2.2	0.9	2.0	3.7	.....	0.54	0.53

Odor, Flavor, and Peroxide Value as Measures of Rancidity in Frozen Ground Pork[a]

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The rancidity of frozen ground pork was evaluated by odor and flavor tests and by peroxide value. The comparative value of these tests for the determination of rancidity is discussed.

Rancidity development is the most important single source of deterioration found in meats stored at low temperatures. The extent of the development is influenced by a number of variables, including the character of the fat, the temperature at which the product is stored, the efficiency of the packaging material as an oxygen barrier, the storage period, and the effects of pro-oxidant and antioxidant additives. The comparative value of methods currently used to measure rancidity is open to conjecture.

The purpose of this investigation was to determine the relationship between the evaluation of rancidity of frozen ground pork by odor, flavor, and peroxide value. The comparisons were made on a wide sampling base in order that the applicability and usefulness of the various methods under consideration might be more adequately evaluated. This paper does not report the effect of the variables on rancidity development other than as they relate to the purpose of the investigation.

Rancidity in pork is generally evaluated by (a) subjective (sensory) testing for flavor or odor by a trained panel, and (b) objective testing for peroxides and aldehydes by chemical methods. Sensory stimulation is a logical method since it is used by the consumer to determine acceptability. Since flavor is a complex type of stimulation of the senses of taste, smell and touch, it is difficult to evaluate *(7)*. Marked variability exists among tasters as to their threshold levels *(5, 14, 25)*. It is also difficult to predict the sensitivity of the individual since pure chemical solutions cannot be used satisfactorily in lieu of the actual product *(12, 14)*. For certain flavor characteristics, the evaluation of odor may be preferable to actual tasting *(8, 9, 15, 22)*. Likewise, there is marked individual variation in the ability to differentiate odors *(5, 6)*.

A major problem in the testing of oily foods is that of fatigue. Fatiguing of panel judges can be minimized by not swallowing the samples tasted, using odor evaluation where possible, and limiting the number of samples to be tasted at any one time *(1, 2, 4, 10, 15, 18)*. With time series studies a reference sample should be used to keep the judges' scores on a comparable basis *(19)*.

Oxidative rancidity may be estimated by the Kreis and peroxide determinations. The Kreis test is specific for epihydrin aldehyde and does not measure the total aldehyde content. Quantitatively it is neither precise nor accurate. It is also affected by the fat content of the sample and hence is of limited usefulness *(13)*. The commonly used peroxide determination, while only measuring an intermediary breakdown product, has the advantage of simplicity and applicability.

Thus both subjective and objective methods of evaluating rancidity are of limited value. Furthermore, the relationship which exists between them is ill defined. This is a matter of concern to those working on rancidity of meats. The work of Vail and Conrad *(22)* with poultry is practically all that has been reported on this problem. These authors studied the relationship of aroma, flavor, skin peroxide, and skin aldehyde to each other. They found (a) aroma to be the limiting factor of acceptance, (b) a significant correlation between the chemical tests, and (c) aroma more closely associated with skin aldehyde than with skin peroxide. These results are at variance with the view expressed that a single chemical test is inadequate for a complex flavor characteristic *(3)*, and that the only really suitable way for determining rancidity is the subjective panel method *(6, 21)*.

EXPERIMENTAL

Because ground pork is relatively homogenous and susceptible to oxidation, it was selected as the sample material. No additives (seasonings) were used because of the pro-oxidant and antioxidant effects of these materials. The following controlled variables were incorporated in the experiment: (a) varying the saturation of the fat and hence its susceptibility to oxidation through feeding a given amount of a soft fat producing ration at various stages of the fattening period, (b) using packaging materials having good and fair oxygen barrier characteristics, (c) storing the product for various lengths of time, and (d) storing at different temperatures.

The ground pork for this experiment was obtained from twenty hogs that were divided equally into four lots of five hogs each prior to the start of feeding on the experimental rations. The hogs in Lot I served as the control group, and consequently made no gain from the soft fat producing ration. The average amount of gain produced from feeding the soft fat rations to Lots II, III, and IV was 36, 73, and 107 pounds, respectively, for each hog. The meat from each hog was ground twice and packaged in two materials; one being an effective oxygen barrier (a glassine-kraft laminated sheet) and the other being of limited effectiveness (a waxed kraft freezer sheet). The samples were frozen on coils at —10° F., (—23° C.) and then stored for 6, 9, and 12 months at 0° F. (—18° C.); 10° F. (—12° C.); 0° and 10° F. (alternating each week); 0° F. storage with one defrosting (thawed to an internal temperature of 40° F.); and 0° F. storage with three defrostings. The defrosting characteristics of frozen ground pork are shown in Figure 1. One sample from each of 5 carcasses in the 4 lots was taken for the two packaging

[a] Contribution from the Missouri Agriculture Experiment Station Journal series Number 1237.

[b] Present address: Swift and Company, Research Laboratories, Chicago, Illinois.

materials at each temperature treatment and each storage time, except that for the two temperatures involving defrosting no samples were taken for the last storage time.

A great deal of consideration was given to the problem of proper sampling technique. Since oxidation proceeds from the exterior to the interior there may be a marked variation in the depth of penetration and in the character of the gradient depending upon the influence of all the variables. Thus the meat may be sampled from the surface or aliquots may be taken of the whole sample for the various determinations. It is the considered opinion of the authors that the latter method is preferable. While the use of the whole sample results in lower organoleptic and peroxide values, these nevertheless can be compared. Surface sampling has marked limitations. The samples must be of uniform dimensions, and the sampling must be standardized to a depth which will include much more than the surface in order to provide adequate material for the various determinations. Seasoned and unseasoned fresh pork sausage is also customarily kneaded and molded into patties prior to cooking which results in the mixing of the surface with the whole sample. Thus any surface relationship is largely lost, and would show little correlation to the deterioration of the whole sample which is being investigated.

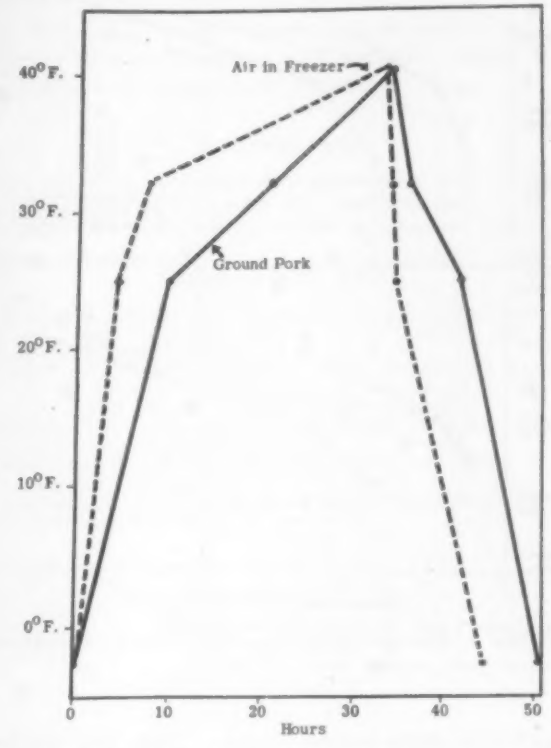

FIGURE 1. Defrosting characteristics of frozen ground pork.

The experimental samples were randomly assorted and coded before cooking. To provide samples in which the flavor and odor were not masked by the browning effect of dry heat cooking, the patties were cooked in small, covered earthenware casseroles for 50 minutes in an oven preheated to 300° F. (149° C.).

At the completion of the cooking period the casseroles were removed from the oven and the odor of the samples was evaluated by each judge. This was performed by moving the casserole lid slightly ajar and sniffing the rising vapors. After each judge had scored the sample, the lid was replaced to prevent the loss of vapors. After the judges had evaluated the odor, the patties were cut into pie shaped wedges, and tasted. A control patty of fresh ground pork marked "fresh" was prepared in exactly the same manner as the experimental samples and presented to the judges as the first sample at each sitting of the panel.

A closed laboratory tasting panel was used. It consisted of four members who were chosen for their accuracy in detecting rancidity in ground pork, and who could be present at every sitting. To test the precision of the panel, ground pork samples known to contain various degrees of rancidity were tasted by the triangular test method *(11)* and the results analyzed as suggested by Boggs *(19)*. The judges proved to be very reliable; the results of the test were significant at the 0.01 level for all judges. A simplified score sheet (Table 1) was used for the experimental samples with rancidity being the foremost consideration. The peroxide determinations were made according to a method described by Stansby *(20)* and modified by the extraction method described by Watts *(23)*. Peroxide values were calculated as milliequivalents of peroxide per kilogram of fat and correlation coefficients were determined according to Mills *(16)*. The terms "odor" and "flavor" will herewith be interpreted as indicating rancidity of odor and rancidity of flavor.

RESULTS

The evaluation of odor poses a problem that is not readily apparent. This is the problem of gauging when the sample is at an optimum temperature for odor evaluation. Cooking the sample in a closed container results in the retention of the vapors including the moisture vapor. If the sample is sniffed too promptly a cloud of steam rises in the judge's face and the stimulation received is predominantly one of heat rather than one of odor. The difficulty is to determine when the steam hazard has just passed and yet the odor vapors are as pronounced as possible. A high concentration of vapor is necessary at the onset in order that the last judge may adequately sample the odor. Since there is a diminution in the intensity of odor it is important that the judges always approach the samples in the same order.

In Table 2 are summarized the correlations found between the results on odor, flavor, and peroxide values. The particular variables used, except for "all variables combined," were selected because they are recommended practices for frozen storage of meat. Since the

TABLE 1

Grading chart used for evaluating cooked ground pork

Sample No..... Date..... Judge..... Experiment No.....

Factor	Phase	Score					Remarks
Odor	Intensity	Strong	Moderate	Weak	None		
	Desirability	Desirable	Acceptable	Undesirable	Very undesirable		
	Rancidity	Sweet (Normal)	Neutral or Flat	Slightly Rancid	Rancid	Very Rancid	
Flavor	Intensity	Strong	Moderate	Weak	None		
	Desirability	Desirable	Acceptable	Undesirable	Very undesirable		
	Rancidity	Sweet (Normal)	Neutral or Flat	Slightly Rancid	Rancid	Very Rancid	

General Remarks

accumulation of peroxides is in the order of a geometric progression, the logarithms of peroxide values were used in the correlations. The coefficients exhibit much variability and a general lack of magnitude although many are highly significant.

TABLE 2

Coefficients of correlation between rancidity of odor, rancidity of flavor, and logarithm of peroxide value for frozen ground pork

Variables	Number of samples	Coefficients of correlation between		
		Odor and flavor	Odor and log. peroxide	Flavor and log. peroxide
6 Months				
All variables combined	200	+0.64**	+0.05	−0.14
0° F. storage	40	+0.51**	−0.21	−0.20
Control ration	50	+0.37**	+0.17	−0.59**
Glassine-Kraft laminate	100	+0.63**	+0.21*	−0.24*
9 Months				
All variables combined	200	+0.67**	−0.17	−0.41**
0° F. storage	40	+0.55**	−0.37*	−0.29
Control ration	50	+0.47**	−0.14	−0.44**
Glassine-Kraft laminate	100	+0.44**	+0.01	−0.40**
12 Months				
All variables combined	120	+0.71**	−0.27**	−0.39**
0° F. storage	40	+0.56**	−0.09	−0.13
Control ration	30	+0.45**	−0.04	−0.21
Glassine-Kraft laminate	60	+0.56**	+0.04	−0.25

** Significant at 0.01 level.
* Significant at 0.05 level.

The highest association was found between odor and flavor, although it was lower and more variable than might be expected. Logically this might indicate that some factor in the organoleptic evaluation of rancidity is not discernible by odor or flavor, or that one is more sensitive than the other to rancidity. It is possible that flavor evaluation detects rancidity factors in addition to those present in the odor. Support for this contention is given in Table 3—where the average odor and flavor

TABLE 3

Average odor and flavor values for frozen ground pork

Treatments	Rancidity of flavor *	Rancidity of odor *	Difference
6-Month period			
All treatments	3.69	3.60	0.21
0° F. storage	3.64	3.68	0.04
Control ration	3.66	3.76	0.10
Superior wrap	3.56	3.63	0.07
9-Month period			
All treatments	2.88	3.17	0.29
0° F. storage	3.28	3.32	0.04
Control ration	3.19	3.38	0.19
Superior wrap	3.15	3.37	0.22
12-Month period			
All treatments	1.74	1.99	0.25
0° F. storage	1.91	2.24	0.33
Control ration	1.88	2.16	0.28
Superior wrap	1.95	2.28	0.33

* 1, very rancid; 2, rancid; 3, slightly rancid; 4, neutral or flat; and 5, sweet (normal).

values are recorded for several of the treatments for each of the testing periods. It will be noted that the flavor score is consistently lower than the odor score which indicates greater rancidity. This was consistent for all treatments and lengths of storage although there was some increase in the difference between the scores as the length of storage increased.

It will be noted in Table 2 that there is a closer association between the flavor and the peroxide value than there is between the odor and the peroxide value. While the relationship is not great, a definite trend is indicated.

A plausible reason for the low correlation between the organoleptic and the chemical tests is indicated in Figure 2. Here the average organoleptic score is plotted against the average peroxide value of the meat from four

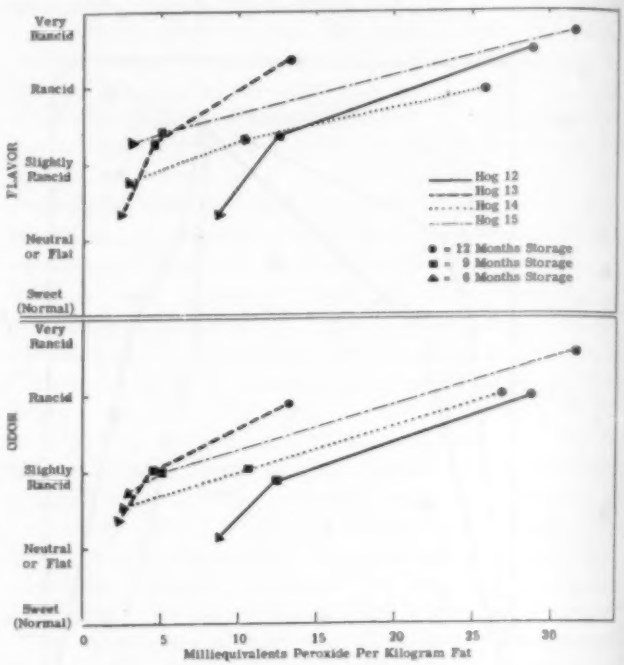

FIGURE 2. Average organoleptic and peroxide characteristics of frozen pork samples from four hogs.

hogs for the three testing periods. These hogs are from the same lot (Lot III) and received identical treatments. There is a tendency for the hogs to be predisposed to individual levels of peroxide for any given degree of flavor or odor. A comparison of hog No. 12 with hog No. 13 illustrates this point; while the flavor and odor scores of these two hogs are very similar in the three testing periods, there is, nevertheless, a wide difference in their peroxide values for each of the respective testing periods. Thus the individual variation in susceptibility to rancidity may account for much of the failure to secure a high overall correlation between the peroxide values and the organoleptic scores.

Some of the results of this experiment are at variance with those reported by Vail and Conrad *(22)* with poultry. Briefly, these are (a) the value of aroma (odor) as a good indication of rancidity, (b) the closeness of correlation between the aroma score and the logarithm of skin peroxide, and (c) the importance of aroma as the limiting factor in acceptability.

There is some indication that a fairly high correlation might exist between the rancidity criteria if the correlations were calculated on an individual carcass basis. This suggests that additional work along this line might further clarify the rancidity evaluation problem.

CONCLUSIONS

1. Flavor, odor, and peroxide values were not found to be closely associated with each other in a study of rancidity in frozen ground pork.

2. Odor and flavor changes were more closely associated with each other than either of these properties with the peroxide value.

3. Odor was not found to be a satisfactory substitute criterion for flavor in the evaluation of rancidity.

4. Flavor was found to be more closely associated with the peroxide value than the odor.

5. The fat of pork carcasses was found to be predisposed to individual levels of peroxide values for a given degree of organoleptic rancidity.

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Principles of Nitrogen Packing in Flexible Film[a]

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The shelf life of dry food products packaged in flexible films can be extended appreciably by the displacement of package free space oxygen by nitrogen and the continued exclusion of atmospheric oxygen from the package during storage. The choice of packaging film of low oxygen permeability, and the methods for checking the effectiveness of oxygen exclusion are discussed. Nitrogen-packed products are compared to air and vacuum-packed products in terms of quality and shelf life stability.

Nitrogen packing has for years been accepted as a means of preventing oxidative deterioration of various perishable food products. Until recently this type of protection has been limited to products packed in rigid containers which could be relied upon to give a tight package. Because of the many cases where flexible film would be advantageous, there has been an increasing demand for nitrogen packing methods in this field. As a result, Linde Air Products Company has in recent years worked in close co-operation with food processors, machinery manufacturers, and producers and converters of flexible films, to assist in the development of practical gas packaging techniques. It is the object here to outline some major requirements for the successful use of nitrogen in commercial operation. The following are some important factors: 1, exclusion or removal of entrained or dissolved oxygen, or both, from the fresh product prior to packaging; 2, exclusion of free space oxygen in the package prior to sealing; 3, use of a packaging material having low oxygen permeability to insure continued exclusion of atmospheric oxygen during the life of the package; 4, proper selection and operation of packaging machines to insure a permanent gas-tight closure; 5, a dry, nondestructive method of testing packages for gas leaks; and 6, adoption of shipping and storage practices which will prevent mechanical failure of gas-tight packages.

In the preparation of many food products it is desirable to exclude oxygen as early in the processing line as is practical. To illustrate with an extreme example,

[a] Presented at the Eleventh Annual Meeting of the IFT, New York, N. Y., June 19, 1951.

the browning of apples or peaches can be prevented by blanketing the original operations with nitrogen and thus excluding the oxygen in the atmosphere which causes the browning to occur *(2)*. Likewise the color and ascorbic acid (vitamin C) content of freshly crushed tomatoes can be protected by nitrogen blanketing. Since we are here concerned primarily with the packaging of dry materials in flexible film, we will not elaborate on these extreme methods of the use of nitrogen processing. In general, most dry materials can be purged of entrained oxygen by either countercurrent nitrogen at atmospheric pressure, or by giving a more extended pretreatment in the form of a vacuum to be followed with a nitrogen breakback. Some of these techniques can be incorporated into the filling hopper or the feed tube of automatic machinery which also forms the package. In all cases it is important to use quality control tests to insure an oxygen-free material going into the package. In addition to performing the above function, a good nitrogen packaging machine must also protect the product during the packaging operation so that the minimum oxygen content of the free space in the package can be satisfactorily met. The packages coming from the machine should be checked periodically for oxygen content. Figure 1 illustrates an apparatus

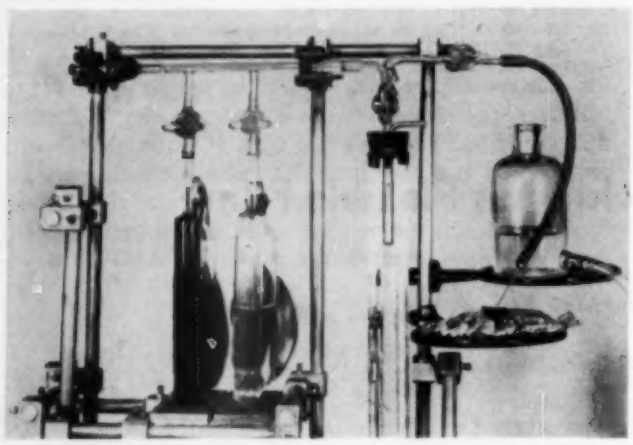

FIGURE 1. Gasometric equipment for analysis of free-space gases in flexible film packages.

used for checking packages in this manner. A rubber patch is cemented onto the package wall to reinforce a spot through which the hypodermic needle is inserted. A small Orsat apparatus is then used to analyze the composition of the gas in the package. Depending on the product and the shelf life desired, acceptable oxygen concentrations may vary from 0.5% to 3%. This same apparatus may be used later on during the life of the package to determine leakers. In this case the Orsat apparatus is used to determine carbon dioxide as well as oxygen.

Although the Orsat apparatus has for years been a standard method of gas determination, it is somewhat slow for making periodic production line checks. Accordingly some compromise has been made with accuracy in favor of speed as illustrated in Figure 2.

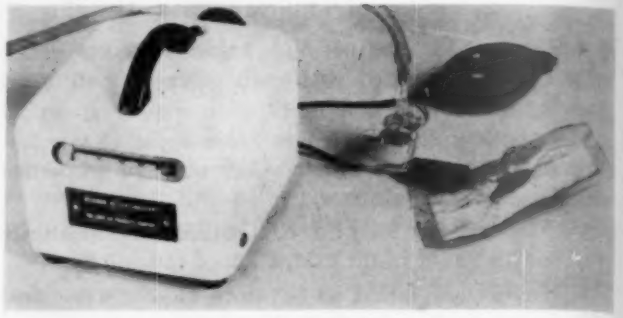

FIGURE 2. Set-up for rapid oxygen analysis of package atmospheres using the Beckman oxygen analyzer.

The Beckman analyzer is purged with pure nitrogen from a cylinder so that its initial reading is zero oxygen. This is done because there is not sufficient volume of gas inside of the package to properly purge the instrument if it were saturated with air at the start of the test. The pure nitrogen purge does result in some error because the package actually may contain somewhat less than 2% of oxygen. After collecting data from several packages using this method and comparing them with known compositions, it has been determined that the accuracy is reasonable for practical control since any severe leakers would show up immediately.

Films considered for nitrogen packing are those with low oxygen permeability. A sensitive method for evaluating these films has been reported by Zambito *(3)*. Work done since the publication of Zambito's paper has been added to give the revised set of values shown in Table 1. So far only one material has been found which

TABLE 1

Oxygen permeability of commercial packaging films

Type of packaging material	Thickness of film	Oxygen permeability[b]
	Inches	*cc./sq. in./ 24 hr.*
Glassine	...	0.47
Vinyl chloride	0.0010	0.19
Polyethylene	0.0010	2.60
Rubber hydrochloride	0.0012	0.55
Regenerated cellulose	0.0010	0.09
Polyvinylidene chloride	0.0005	0.007
Polyvinylidene chloride	0.0015	0.0008
Polyvinylidene chloride	0.002	<0.0002
Modified polyvinylidene chloride	0.001	0.01
Polyethylene coated Kraft paper	0.0054	0.040
Laminates:		
Rubber hydrochloride and regenerated cellulose	0.0032	<0.0002
Polythylene and regenerated cellulose	0.0030	<0.0002
Foil, regenerated cellulose, and paper	0.0058	<0.00002
Rubber hydrochloride and foil paper	0.004	<0.00002
Rubber hydrochloride, foil glassine, and foil	0.0032	<0.00002
Coated films:		
Polyethylene (0.0015") coated with polyvinylidene chloride (0.001")	0.0025	0.005
Acetate (0.001" coated with polyvinylidene chloride (0.002")	0.003	0.0006

[b] Oxygen permeability rates determined at 100° F. and 75% relative humidity.

can be used as a single transparent film with sufficiently low oxygen permeability to recommend it as a material for nitrogen packaging. However, it will be seen that there are several laminated and coated film materials

both of the transparent and the opaque variety which give excellent performance in this regard. Corresponding shelf life tests of various products sealed in these films prove that this test method represents actual packaging conditions. Sufficient data are now available so that it is possible to predict what shelf life can be expected of certain materials when packaged in nitrogen with certain films. This point is illustrated in Figure 3, where it has been assumed that the product would stand a maximum of 3% oxygen in the package before suffering ill effect. Using this chart it is possible to pick the necessary oxygen permeability of a film to give the required shelf life.

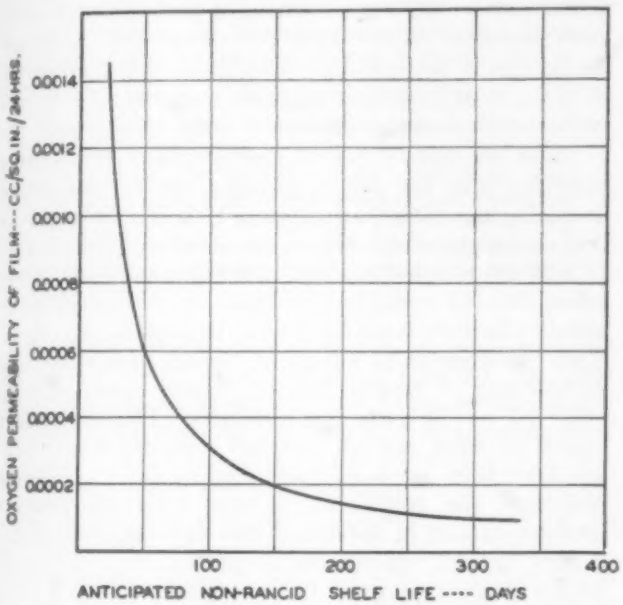

FIGURE 3. Calculated relationship between film permeability and shelf life of product. 3 oz. peanut package, 30 sq. in. of surface area, 30 cc. free space gas volume, initial oxygen concentration 0.09%, and assumed mass transfer of oxygen 1.0 cc.

Over the years there has been considerable work done on the water-vapor transmission rate through packaging materials, particularly films. However, relatively little attention has been given to the gas permeability of the same films. From the work done so far by Linde it is evident that all films which effectively exclude oxygen will also exclude moisture although the reverse is not always true. As an example, there are several film materials which are effective moisture barriers but are not effective oxygen barriers. Some of these films are used for the pre-packaging of fresh vegetables since it is desired to retain their moisture inside of the package, and at the same time allow them to breathe because they are living organisms. These same materials may be used for packaging freshly ground coffee since they will allow the carbon dioxide gas, which is generated over a period of several days, to diffuse through the wall of the bag and therefore prevent it from rupturing. These materials, however, do not prevent oxygen from re-entering the bag in seeking its partial pressure. However, the coffee is kept fresh so far as humidity control is concerned due to the low water vapor transmission rate of the materials used.

Film materials suitable for gas packing should give a durable package. Excessive folds, scuffing, or creasing can cause leaks to develop during storage, transportation and handling. Suitable shipping containers should be provided to guard against these troubles as mechanical failure of the package must be prevented. After means have been established to assure an oxygen-free product going into the package, and a suitable film material has been selected, it becomes necessary to consider methods by which satisfactory closures can be obtained at practical packaging speeds. Several machinery manufacturers supply equipment which is being used for nitrogen packaging operations in flexible films. At least three manufacturers are in the process of adapting electronic sealing for the polyvinylidene chloride film used in nitrogen packaging. Two of these manufacturers are working on designs which may be adaptable to "bite size" potato chips and related products. In general, the machines available can purge oxygen from the product, and package the product in nitrogen at atmospheric pressures. One machine first evacuates air from the filled package, breaks back the vacuum with nitrogen to about atmospheric pressure, and then seals.

The successful use of nitrogen depends on a tight package. This requires the co-operation of the machine, film, and gas vendors. They must have a common understanding as to what constitutes an acceptable package, particularly with respect to leakage through seals. There is a need for a simple and impersonal leakage test to prove the package air tight.

The food technology laboratory of Linde Air Products Company has recognized the need for such a test and made a start toward its development. The method measures dimensional changes of sealed bags maintained under conditions of controlled inflation by means of a vacuum system.

Changes of bag dimensions during the period of inflation may be measured by contacting the upper surface of the bag with the spindle of a sensitive dial thickness gauge. Leakage is shown by the rate of deflation which can be measured within thousandths of an inch. Even the smallest type of seam imperfections may be detected in this manner within minutes. The method has the advantages of being direct reading, rapid, and that tight packages are not damaged during testing, thereby avoiding losses of product or packaging material. Periodic testing in production can be used to indicate good sealing performance. Figure 4 shows how the package to be examined is positioned on the platform below the spindle of the indicator. The height of the spindle foot above the bag is adjusted to permit appreciable travel of the spindle after the stabilizing period in case the bag leaks. Any package found to maintain a static dial reading for 60 seconds is considered to be a satisfactory closure. Curves showing typical examples of leaking and non-leaking flexible containers are shown in Figure 5 where the rate of leakage as indicated by spindle travel was substantiated

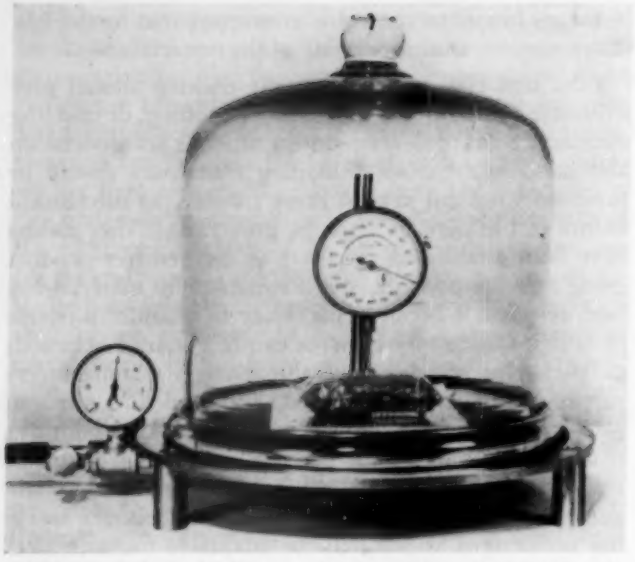

FIGURE 4. Non-destructive leakage testing method for flexible films employs vacuum and a sensitive dial thickness gauge.

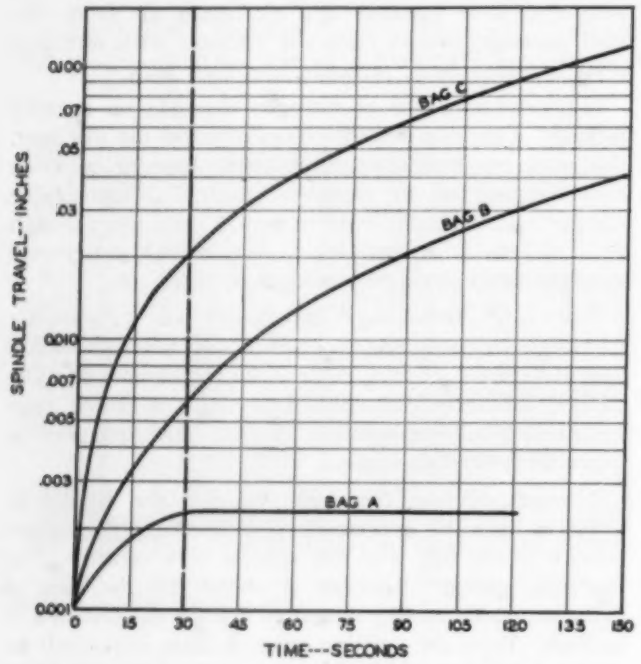

FIGURE 5. Typical results obtained on proposed leakage tester: spindletravel vs. time. Initial oxygen concentration was below 0.5%. A, 0.7% oxygen after 6 months; B, 4.2% oxygen after 10 days; and C, 8.6% oxygen after 10 days.

by analyses showing oxygen build-up in nitrogen-packaged products after storage. Thus, containers indicating leakage as determined by the proposed method should be considered as unsatisfactory.

In case the principle of this laboratory model meets with the approval of the proper committee, it is possible that some equipment builder might offer an industrial model to the food industry.

BENEFITS OF NITROGEN PACKING

When the foregoing requirements are followed in nitrogen packing it is possible to realize remarkable improvements in the shelf life stability of various food products which otherwise deteriorate from oxidative reactions. Nitrogen packing has been used to correct specific complaints in regard to taste, odor, color, rancidity formation, and retention of vitamin content. Transparent films can be used without fear of daylight exposure, since ultraviolet light cannot catalyze oxidative reactions unless oxygen is present *(1)*. As mentioned previously, a good nitrogen package invariably gives excellent water-vapor protection also, although the reverse is not true in certain films. Another object of nitrogen packing in some cases is to make the use of refrigeration or anti-oxidants, or both, unnecessary.

There are many types of food products which have benefited from the use of nitrogen during processing or packaging. One large class which has benefited is that containing edible oils in one form or another *(1)*. In addition to salad oils and shortening products themselves, this list would include foods which contain oil or fats or which are cooked in them. In general, the results from investigation of effects of storage atmosphere on the stability of freshly roasted peanuts also apply to other oil or fat-containing products. These data are typical of what can be expected with other products and have been previously published by Bayes *(1)*, who presented the results of storage tests on peanuts nitrogen-packed in laminated film as compared to the control samples which were air-packed. In the case of freshly roasted peanuts, the rancidity point has been determined by taste panels at a peroxide value of 3 milliequivalents. The samples were stored at room temperature under normal daylight exposure for a period of several weeks. The nitrogen packaging maintained a zero peroxide number for a period of ten weeks, at which point the curve started to slope upward and reached only the one milliequivalent level at the end of 17 weeks. The air pack control samples held a non-rancid shelf life for a period of four weeks, after which they became rancid.

The number and variety of food products which benefit from nitrogen packaging is constantly growing.

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Present Status of the Theory of Bread Staling[a,b]

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Currently, those changes which occur in the starch component of bread on aging are considered to be of major importance in the explanation of the bread staling phenomenon. There is serious disagreement as to the validity of the methods employed in measuring these changes, or other changes which occur in bread associated with these changes in starch, and to their significance. Since staling is of economic importance because of consumer judgment, organoleptic testing appears to have fundamental significance. There is need, however, for laboratory tests (physical or chemical) which can be applied and evaluated rapidly. These various methods of measuring staling rate, such as compressibility, firmness, soluble starch, swelling power, farinograph consistency, crumbliness, and organoleptic evaluation, are discussed with interpretations based upon laboratory data. Certain of these data show that soluble starch, whether it be determined as total soluble carbohydrate, soluble amylose or soluble amylopectin, cannot be related to the staling process. The role of starch in the bread staling prenomenon is discussed.

The problem of bread staling is of great economic importance, not only to the baking industry, but to the consuming public as well. Annual losses to the industry from stale and unsalable bread have been estimated to amount to 3 to 5% of the total production *(11)*. Besides, there is the loss to the consumer because of bread which becomes stale and unpalatable following its purchase.

Frequently staling is confused with the drying-out of bread. That the two processes differ was shown as early as 1852 by Boussingault *(5)* who sealed bread in a glass tube to prevent loss of moisture. He found that although the moisture content remained constant under these conditions, the bread became stale. The characteristics of staleness observed by the consumer are a hardening of the crumb with a dry feeling in the mouth, an increase in crumbliness, loss of flavor and aroma, and a softening and toughening of the crust. Crust staling has been shown to be due entirely to absorption of moisture from the atmosphere and from the interior of the loaf. Crumb staling, however, appears to be a complex phenomenon, and it is this process which is of the greatest importance in the loss of palatability.

The problem of bread staling has been studied by scientists for the past century, with most of the emphasis centered on changes in the crumb. In the course of this research a number of theories have been proposed to account for the changes which cause loss in the palatability of bread. These fall into three broad groups. In one, staling is attributed to changes in the moisture distribution between the components of the loaf *(1)*. In the present time most investigators believe that staling is due to alterations in starch *(9, 13)*, although the mechanism of the changes is not satisfactorily explained. the second, staling is thought to be caused, at least in part, by changes which occur in the gluten *(1, 2)*. At

Whatever the cause, the determination of staleness is a matter of consumer judgment, and is based on several sensory perceptions. Firmness of the crumb, the feel of the surface of a cut slice, odor, flavor, and feel in the mouth are all involved in the judgment as to whether bread is fresh or stale. As bread ages the crumb becomes firmer, the texture of the crumb becomes harsh and crumbly, the pleasant odor of fresh bread is lost, the flavor at first diminishes after which a stale flavor develops, and the feel in the mouth changes from soft to dry and harsh. Other changes which accompany the staling of bread, have been observed in the laboratory. Among these are a decrease in the water absorptive capacity of the crumb usually measured in terms of the ability of the crumb to swell in water, a decrease in the amount and composition of the soluble carbohydrate which can be extracted from the crumb, an increase in crumb opacity, and changes in the x-ray pattern of the starch *(7)*.

In the scientific study of bread staling it has been the usual procedure to use one or more tests based on the changes which occur as bread ages. A number of instruments and procedures have been designed and used to determine crumb firmness or compressibility, crumbliness, water absorptive capacity, soluble starch extractable from the crumb, and the amount of amylose and amylopectin in the soluble starch. These methods have recently been critically reviewed by Bice and Geddes *(4)*. X-ray diffraction, crumb opacity, and viscosity have been employed for the measure of changes which occur in bread as it ages but because of the nature of such measurements and the required apparatus, they have not been used extensively.

EXPERIMENTAL PROCEDURES

Breads. Breads used in these experiments were obtained locally from a wholesale bakery or were baked in the laboratory under conditions simulating commercial practice. The formulas used for the laboratory-baked bread were as follows:

	Parts per 100 parts flour
Sponge	
Flour	60
Water	variable
Yeast	2
Arkady	0.5
Barley malt flour	To Amylograph value of 500 Brabender units.
Dough	
Flour	40
Water	variable
Salt	2
Sugar	4
Shortening	2
Non-fat milk solids	4

[a] Presented at the Eleventh Annual Meeting of the IFT, New York, N. Y., June 18, 1951.

[b] The study on which this article is based was made by the American Institute of Baking under contract with the U. S. Department of Agriculture and under the authority of the Research and Marketing Act.

Variables of absorption, mixing, fermentation time, etc., were set at optimum as determined by a previous baking series of the flour. Loaves were scaled at 18½ ounces, proofed to height (¼ inch above pan), and baked 27 minutes at 450° F. (232° C.).

Laboratory-baked bread made of flour reconstituted from gum gluten and starches, available commercially, was prepared by use of the above formula except for the flour. Fifteen parts of gluten and 50 parts of starch were thoroughly mixed by sifting. This mixture was then used as the "flour" for the sponge. Thirty-five parts of starch were used as the "flour" for the dough. The gluten content of the flour was found to be 12.2%, based on the Kjeldahl nitrogen analysis of the gluten concentrate.

Bread used for the data in Tables 2 and 3 was obtained directly from the bakery, so that the time when the bread left the oven was known.

Physical testing methods. Crumb moisture and compressibility measurements were made by the procedures of Bradley and Thompson *(6)*. Soluble starch and crumb swelling power were determined by the methods of Schoch and French *(13)*. Amylose content of the soluble carbohydrate fraction was determined by potentiometric titration with iodine, using the method of Bates, French, and Rundle *(3)* as modified by Wilson, Schoch, and Hudson *(14)*.

Crumb swelling power is reported as grams of residue per gram of dry crumb.

Crumbliness was determined as follows: Two center slices, 2 inches thick, were cut from a loaf of bread. Beginning 1 inch from the bottom of each slice, 8 cubes of 1 inch dimension were cut from each slice. The 16 cubes were placed on a U. S. No. 4 sieve, covered on top and bottom, then were shaken in a mechanical shaker at constant rate for 15 minutes. At the end of this period, cubes and crumb were weighed separately. Crumbliness was calculated as the percent of crumb which passed through the sieve.

Organoleptic evaluation of staleness. Three lots of bread made from identical ingredients, formula, and procedure were obtained locally from a wholesale bakery at 12 hour intervals so that the sole increment of difference was 12 hours of age. These breads were paired in three ways and the pairs presented to members of a taste testing panel consisting of students and staff of the American Institute of Baking. On each day of the test the subjects were presented with the samples and were directed to ascertain which sample of each pair was the fresher. The subject was allowed to make his selection individually and on the basis of taste, touch, odor, appearance, or any combination of factors he so desired and was permitted cool water to rinse his mouth between samplings. The test was carried out on each of four successive days, the age of the breads on the first day of the test being 5, 17, and 29 hours respectively. The percentages of correct judgments for each pair on each day of the tests were calculated. These percentages were then translated into standard measurements and the average scale value for each stimulus computed by Thurstone's procedure *(8)*.

RESULTS AND DISCUSSION

Comparative data obtained by physical tests made on a typical laboratory-baked bread during the staling process are shown in Table 1.

TABLE 1

Typical laboratory methods of determining staling rate of bread

Age of bread	Crumb moisture	Crumb compressibility	Crumbliness	Crumb swelling power [a]	Soluble starch
hrs.	%		%		%
2	43.6	216	0.4	4.26	5.12
14	42.9	126	4.2	3.64	4.14
26	42.3	90	10.3	3.28	3.64
38	41.5	85	12.1	3.08	3.35
50	41.3	71	12.8	2.99	3.22
62	41.1	68	15.8	2.92	2.70
74	40.8	34	18.0	2.89	3.14
86	40.0	45	19.6	2.83	3.13
98	39.9	39	20.8	2.79	3.17

[a] See text for units.

It may be observed in column 2 that although the bread was stored under conditions which prevented loss of moisture from the loaf, the crumb moisture showed a steady fall from 43.6% for fresh bread to about 40% for bread 98 hours old. This indicates that moisture migrated from crumb to crust during the aging process. It may also be observed that with increasing age the bread became firmer (less compressible), the crumbliness increased, while the swelling power and the amount of soluble starch decreased.

Tests such as those above have been considered by many investigators to measure quantitatively the staling of bread. Although these investigators have found such changes to be progressive with time it has not been established that these measures correlate with consumer judgment of staleness. Staling phenomena are subjective in uature. Bread is fresh if the consumer judges it to be fresh, regardless of its age in hours.

It seemed of fundamental importance to test the generally used laboratory measures of staleness against the results of consumer judgment, using a large, randomly selected panel of subjects so that the judgment of the panel would approach that of the consuming public. It was expected by this means to obtain evidence as to the reliability of physical laboratory staleness tests.

In Table 2 data are given to compare organoleptic judgment of staling of a typical white bread stored at 75° F. (23.9° C.) with the physical laboratory methods.

TABLE 2

Comparison of organoleptic judgment of bread staleness with laboratory methods. Storage temperature 75° F. (23.9° C.)

Age	Crumb compressibility	Organoleptic scale value	Swelling power	Crumbliness	Soluble starch	Soluble amylose
hrs.				%	%	%
5	210	0.00	3.84	4.6	2.17	0.17
17	185	0.72	3.45	10.6	1.81	0.09
29	155	1.10	3.24	11.7	1.90	0.09
41	129	1.43	3.16	19.3	1.99	0.11
53	119	1.76	2.97	19.7	1.71	0.10
65	101	2.35	2.97	23.3	2.17	0.11
77	92	2.57	2.93	28.0	2.17	0.11
89	86	2.71	2.94	32.0	2.17	0.11
101	73	2.85	2.84	28.0	2.12	0.11

It may be observed that this bread was judged organoleptically to be of decreasing freshness as the bread aged. Along with this change in judgment occurred changes in crumb compressibility, crumb swelling power, and crumbliness. One should not expect the various tests to agree quantitatively. A relatively small change in crumb swelling power might, for example, have a large effect on crumb compressibility or crumbliness. A small change in any property might have a relatively large effect upon consumer judgment. The amount of soluble starch extracted from this bread remained unchanged during the staling period and its amylose content, as determined potentiometrically, remained without change after the bread was 17 hours old.

Similar tests were made, using a storage temperature of 40° F. (4.4° C.). At this temperature of storage the organoleptic panel judged staling to occur more rapidly than at 75° F., confirming observations of Katz *(9)* and other investigators *(7)*. Changes in

TABLE 3

Comparison of organoleptic judgment of bread staleness with laboratory methods. Storage temperature 40° F. (4.4° C.)

Age	Crumb compressibility	Organoleptic scale value	Swelling power	Crumbliness	Soluble starch	Soluble amylose
hrs.				%	%	%
5	190	0.00	3.93	2.6	2.30	0.18
17	100	1.58	3.09	20.0	.....	.....
29	81	2.27	2.92	26.2	2.33	0.13
41	61	2.73	2.78	32.1	2.42	0.16
53	50	2.93	2.74	36.1	2.38	0.14
65	49	3.50	2.67	37.7	2.32	0.14
77	37	3.54	2.59	36.3	2.14	0.13
89	38	3.83	2.59	41.3	2.22	0.13
101	24	4.12	2.61	38.4	2.19	0.13

crumb compressibility, swelling power, and crumbliness were also greater, indicating qualitative agreement of these methods with consumer judgment. Again, as at 75° F., there was no significant change in the amount of soluble starch or of its amylose content during the staling process.

To be used as a criterion of staling, a laboratory test must show changes to occur in a regular manner as the bread is judged of decreasing freshness by the organoleptic panel, and this agreement must be found with any and all kinds of bread. On this basis it is concluded that the measure of soluble starch and its amylose and amylopectin content is not an indication of the staling of bread. The validity of this observation has been further confirmed by the preparation of breads through the addition of soluble starch, amylopectin and amylose, and by the addition of amylose-complexing fatty acids. Although these breads varied considerably in their content of the soluble starch and its fractions, there was no apparent alteration in staling rate.

This does not preclude the possibility that the staling of bread may be due to changes in the granule structure of the starch which are quite independent of the soluble starch fraction.

To determine the effect of different starches on the firmness of bread during aging, bread was made from flour reconstituted of commercially available wheat gum gluten and each of the following starches: wheat, potato, corn, and tapioca. It may be observed in Table 4 that

TABLE 4

Changes in crumb compressibility of bread made of flours reconstituted of wheat gluten and starch

Age of bread *hrs.*	Wheat starch	Potato starch	Corn starch	Tapioca starch
2	100	123	63	263
24	20	5	1	90
48	11	3	0	24
72	7	2	0	11
96	4	1	0	4
Gelatinization temperature *(10)*	56° C.	55° C.	64° C.	61° C.
Granule size, microns *(12)*	2-35	15-100	10-25	5-35

these breads, with the exception of that made from tapioca starch, were all rather firm when only 2 hours out of the oven. In all cases they became firm more rapidly than bread made of flour. It does not appear possible to relate the differences in rate of firming either to granule size of the uncooked starch or to the gelatinization temperature of the starch, values for which are given in Table 4. Corn starch, wheat starch, and tapioca starch granules fall within approximately the same size range, though wheat and tapioca starches have some granules both smaller and larger than corn starch. Potato starch granules are of much larger size, yet bread made using potato starch and corn starch became firm most rapidly. The gelatinization temperatures of wheat starch and potato starch are 132.8° F. (56° C.) and 131° F. (55° C.) respectively while that of tapioca starch is 141.8° F. (61° C.) and that of corn starch is 147.2° F. (64° C.). It is thus apparent that breads made of the starches with lowest and highest gelatinization temperature were alike in becoming very firm within 24 hours. The rapidity of firming of all of these breads suggests that either the starches have been altered in processing or that some constituent of flour other than starch has a role in the firming process.

SUMMARY

The staling of bread represents a complex transformation which is not clearly understood, and it has been customary to evaluate the degree of staleness by measuring one or more of the several progressive changes which occur in bread on aging. Unless it can be shown that these changes agree with consumer evaluation of staleness for all breads, such measurements are of doubtful value. It has been shown that changes in soluble starch or its fractions do not correspond with consumer evaluation of staleness. To assume that other physical changes measure staleness does not seem warranted on the basis of our present knowledge.

The hypothesis that the starch component of bread is partially responsible for the staling phenomenon is reasonable. The possibility that some fraction of flour other than gluten or starch may have a restraining influence upon staling is a distinct possibility and is the subject of further investigation in this laboratory.

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Preservation of Milk by Radiation[a]

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A study of the effect of X- and γ-radiations on raw food products has been undertaken. This paper presents the results of work carried out to determine the effects of 2 m.e.v. x-rays on unpasteurized milk. Samples irradiated with dosages up to 1.83×10^6 Roentgen (R) were found to be unaltered in color and texture. No organoleptic changes were detected in samples receiving radiation doses up to approximately 100,000 R and no appreciable reduction in the Vitamin A and riboflavin content was observed at these levels. Over 90% of the microbiological population was destroyed with dosages over 40,000 R and storage life of the samples was greatly prolonged.

The deterioration of foods is ascribed mainly to the action of microorganisms and to inherent enzymic processes. Food processing is based chiefly on either the heat lability of these organisms and enzymes, or the ability of refrigeration temperatures to render them dormant or of very low acivity. If food is to be stored, microorganisms present must be destroyed, and reinfection prevented. Another possibility is to create an environment which precludes bacterial growth. Canning is an example of the former method; freezing, dehydration, and salting are adaptations of the second principle. Preservation methods in current use usually change the nature and texture of the foods and at times reduce their nutritive value. Freezing changes food least, but is, in general, the most costly and complicated process. The objections to methods in current use would thus lead us to investigate other possible means of preserving foods, particularly in their normal fresh forms, and with their nutritional values unimpaired.

The bactericidal action of electromagnetic radiations have inspired various investigations and patents in the field of milk processing. The general feasibility of irradiating whole foods with cathode rays (electrons) has been illustrated by Trump and Van de Graaf *(10)* and Dunn, Campbell, Fram, and Hutchins *(4)*, using a 2-million v. Van de Graaf generator, and by Brasch and Huber *(2)*, who worked with a so-called "Capacitron." This method is fundamentally different from thermal processing as the heat effects involved are insignificant. For instance, in water a temperature rise of 2° C. results from a radiation of 10^6 Roentgen per gram.

Unfortunately, the penetration ranges of accelerated particles, such as electrons, are very limited and the expense and inefficiency attending the production of x-rays has limited their application in food processing and preservation. In recent years, however, waste fission products from nuclear reactor installations have accumulated to such an extent that they now provide potentially cheap and practicable radiation sources of very high intensities *(8)*.

This paper presents the results of a preliminary study, restricted both by its exploratory nature and by personnel and equipment limitations to the following specific questions:

1. Is it practicable to preserve complex foods with radiations typical of those emanating from mixed fission products?
2. What intensity levels will be necessary in the radiation sources?
3. Will the radiation-treated food retain its normal organoleptic properties?
4. What order of impairment of nutritive values can be expected?

EXPERIMENTAL PROCEDURE

Samples of whole, unpasteurized milk were obtained from agitated tanks which were supplying pasteurization and homogenation units of a milk processing plant less than two hours before the experiments. At the time the radiation samples were transferred into the irradiation vessel, controls, which accompanied the samples and were also handled aseptically, were placed in appropriate control flasks. The irradiation vessels (Figure 1) were flatsided glass receptacles constructed to fit into

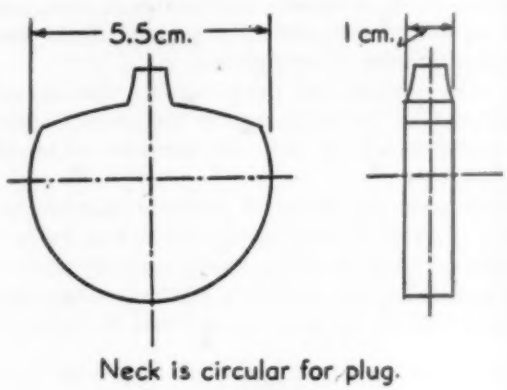

FIGURE 1. Radiation vessel.

the 5.9 cm. diameter opening in the radiation chamber of the x-ray machine. A 2-million electron-volt resonance generator, manufactured by the General Electric X-ray Co., was used.

The unit was calibrated with a thimble counter inserted into a passage drilled through a wooden dummy block which replaced the lead chamber during this determination. A dose rate of 73,000 R per minute was delivered by the machine with the ionization chamber 5 cm. from the tube. The energy actually absorbed by a milk sample during radiation was not measured directly. The dosages reported in this paper are the product of the dose rate, obtained by thimble counter calibration, and radiation time and are therefore expressed in Roentgens (R) rather than in physical equivalents.

Immediately following irradiation, a standard bacterial count *(1)* was carried out on both the control and the treated samples. By this method only the gross effect of radiation treatment on the microbiological population of the milk was determined and no attempt was made to distinguish between effects on the dif-

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[b] Presented at the Eleventh Annual Meeting of the IFT, New York, N. Y., June 20, 1951.

ferent species present. It is recognized that one of the primary purposes of heat pasteurization is the destruction of pathogenic types possibly present in the milk. Certainly a detailed investigation of the bacterial inactivation pattern obtained with radiation is absolutely necessary but it was not considered to be part of a preliminary study of the feasibility of radiation preservation.

Next, Vitamin A and carotene were determined spectrophotometrically *(5, 13)*; a fluorometric analysis was carried out for riboflavin (Vitamin B_2) *(11)*. Due to the limited size of the irradiated sample (12 ml.) only one analysis was performed for each vitamin. Test for phosphatase activity was ascertained by a methylene blue test *(11)*. A 1200-v. counter (Nucleonics Corp. of America, Model RC 1AB) was used to check for radioactivity. The remaining sample was then tested for keeping qualities. High temperature storage took place at 30° C. in a thermostatically controlled electric oven. Another portion of the sample was kept at 10° C. in a laboratory refrigerator. Portions of each sample (treated and control) were removed daily and rated by not less than two persons. Each sample was organoleptically evaluated against fresh unpasteurized milk for appearance (texture and color), flavor, and odor. As soon as a sample (treated or control) was rated unsatisfactory by one taster, it was considered unsalable but was retained in storage until it was similarly rated by all tasters. In all cases where the initial unsatisfactory rating was not unanimous, no more than 24 hours elapsed before agreement was reached. The nature of the samples was, of course, not revealed to those making the taste tests. The storage time recorded in the tables is that of the first unsatisfactory rating.

EXPERIMENTAL RESULTS

The percentage decrease in total microbiological population (based on the control samples) determined by plate count, is plotted versus the total dosage (in Roentgens) in Figure 2. Vitamin analysis results are presented in Table 1. Only one methylene blue test for enzyme activity was performed; this was negative for a sample which had received a dose of 70,000 R. Storage life of the samples is indicated in Table 2. If an asterisk appears next to the storage time, it signifies that the sample was still salably fresh at the time these experiments were terminated. No color or texture change, or radioactivity could be detected in any sample, regardless of dosage. No flavor changes in the milk could be noticed for samples which had been radiated with dosages under 73,000 R. With greater dosages the milk began to assume the flat flavor characteristic of pasteurized milk. The sample which received 1.83 million R acquired an undefined, but marked, off-flavor.

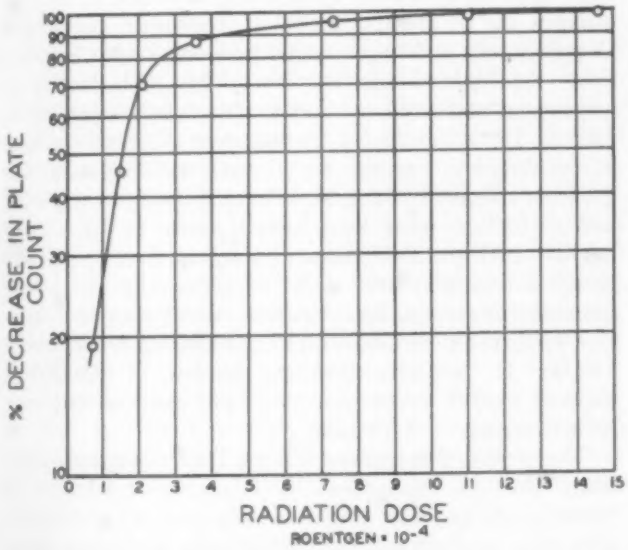

FIGURE 2. Effect of radiation dose on the percent decrease in microbiological population.

TABLE 1

Vitamin analyses of irradiated milk samples

Dosage	Vitamin A	Carotene	Riboflavin
	γ/ml.	γ/ml.	γ/ml.
73,000 R	1.22	1.34	0.721
Control	1.16	1.58	0.724
146,000 R	.....	.....	0.782
Control	.....	.....	0.815
292,000 R	0.80	1.20	0.456
Control	0.88	1.58	0.750

TABLE 2

Storage life of irradiated milk

Dosage in R	Hours sample kept at		Ratio: Hours radiated sample kept / Hours control kept	
	30° C.	10° C.	30° C.	10° C.
8,000	20	320	1	1
Control	20	320		
14,500		380		1.27
Control		300		
36,400	19	408	1.12	1.47
Control	17	288		
73,000	20	625[c]	1.2	1.95[c]
Control	14	320		
146,000	28	675[c]	1.4	2.08[c]
Control	20	325		
292,000	40	675[c]	2	2.08[c]
Control	20	325		
548,000	91	770[c]	5.35	2.68[c]
Control	17	288		
1,830,000	140[d]	1750[d]	7[d]	5.0[d]
Control	20	350		
Pasteurized sample	21	350	.....	.....

[c] Samples still fresh at time experiments terminated.
[d] Sample evaporated.

ANALYSIS OF RESULTS

Vitamin content. Vitamin analyses indicate that there is only a negligible reduction in A and riboflavin content at dosage levels less than 80,000 R. Proctor and Goldblith *(7)* irradiated pure vitamins in solution with 3 m.e.v. x-rays and found 100% retention at high vitamin concentrations (100 γ/ml.), and reported an irregularly increasing destruction of niacin, carotene, riboflavin, and ascorbic acid with lower vitamin concentrations. They therefore conclude that the action of the X-rays is indirect, that is, an ionization in the solution with a subsequent solute-free radical reaction leading to the destruction of the vitamin molecule. Since the number of ions produced in solution is constant for any dosage level, one would expect approximately the same number of solute molecules to be destroyed at any one dosage. Therefore a greater percent reduction in activity is expected as the concentration of solute is descreased. They also report preferential destruction of particular molecules when mixtures of vitamins were exposed to the radiation. This protective action is especially significant when a complex substance such as milk is the subject, insofar as certain structures are present which are preferentially capable of reacting with the "activated water" [consist-

ing of H and OH radicals *(9)*], and so of competing with the solutes for the free radicals formed. It is therefore to be expected that the amount of the vitamins reacting per unit dose will be diminished.

Microbiological population. The ultimate lethal action of electromagnitic radiation has never been clearly established. The intimate organization of even the simplest cell is largely unknown and thus the complex and obscure nature of the biological reactor serves to make any mathematical approach an extreme oversimplification. The simple one hit-one effect interpretation of Dessauer *(3)* is, with great refinement, still the basis of most modern theories. According to this "target theory" the particular effect of the radiation occurs whenever an ion cluster is produced inside one or more of the "sensitive volumes." The theory is therefore intrinsically limited to those cases where the action is in the nature of a gene mutation and may be attributed to a single ionization or ionizing particle. This hypothesis should enable one to deduce the size of the sensitive molecule from the inactivation dosages, since it is possible to calculate the number and distribution of the ionizations accompanying the radiation. Lea *(6)* was thus able to estimate the diameter of 20 out of 23 viruses and phages within a factor of 2 of values determined by other means. In the case of viruses the entire particle is considered the sensitive volume. Erratic results are obtained if this theory is extended to larger microorganisms. One must assume that the sensitive volume calculated corresponds to the volume of a chromosome, and then by assuming a number of genes it becomes possible to correlate some of the data. A substantial argument in favor of this approach is that the lethal actions appear to be linked with the genetic mechanism. The evidence to bear this out is that no visible physical change takes place after the lethal radiations, but it would appear that the cells actually die at the instance of or immediately following division. This has been substantiated for doses under 10,000 R and it seems to hold for larger doses.

The survival curve (Figure 2) shows the destruction of the organisms to be a first-order reaction until approximately 70% of the organisms are destroyed, then the curve begins to slope convexly upwards. This curvature cannot be reproduced mathematically unless it it permissible to assume either an interaction between the cells, analogous to a second order chemical reaction, or some type of indirect lethal mechanism. The former hypothesis may be ruled out a priori; the latter theory would lead one to expect a curve that is concave downward or sigmoidal in form, since the reaction would build up slowly, i.e., the formation of toxic products, or the production of an uninhabitable environment. Another line of reasoning, completely analogous to assuming a first order chemical reaction (rate of decomposition proportional to amount present) may be followed. If the solution contains a mixture of microorganisms and if the proportion of organisms not so far hit (still viable) but which will be hit in time dt is dn, then the change in viable organisms is proportional to the amount present any time. This follows from the fact that although the total number of organisms hit by X-rays increases in strict proportionality to the dose, the number of targets hit increases more slowly, and the number of viable organisms falls off in a geometrical progression.

The total number of microorganisms, N, present at any time, is the sum of $n_a + n_b \ldots + n_i$. At any time during the radiation $-dn_i = n_i k dt$. Substituting D, the dose, which is proportional to the time, and integrating between the limits n_{oi}, the initial concentration of n_i, and D_o the radiation at that time:

$$-\int_{n_{oi}}^{n_i} d(\ln n) = k\int_{D_o}^{D} dD\,;\ \ln\frac{n_i}{n_{oi}} = -k\,(D - D_o)\,;$$

$$\text{and } n_i = n_{oi}\, e^{-k(D-D_o)}$$

Summing up; N, the total number of organisms present at any time is

$$N = n_{oa}\, e^{-k_A(D-D_o)} + n_{ob}\, e^{-k_B(D-D_o)}$$

From experiments carried out with pure cultures, the constants k_a, k_b, k_i can be individually determined, and thus, by knowing the cumulative radiation and the initial concentration of each organism, it is possible to estimate the number of viable bacteria present at any time. This type of treatment gives a number of straight lines which, in the limit, describe a curve of the type observed.

CONCLUSIONS

Samples of raw milk treated with 2 m.e.v. X-rays at dosages up to about 100,000 R remained unchanged in appearance and organoleptic properties after irradiation. At higher radiation levels the milk began to acquire an undefined off-flavor, although dosages up to 1.83×10^6 R resulted in no apparent physical changes in the samples. Storage life of the irradiated milk was greatly prolonged. Samples receiving dosages of 36,400 and 73,000 R were kept salably fresh at 10° C. for periods 1.43 and 2.25 times as long as their respective controls. Samples held at 30° C. showed proportionate increases in storage life. Vitamin A and riboflavin content appeared to be unimpaired at radiation levels under 146,000 R. Samples receiving dosages of 300,000 R showed a 40% decrease in riboflavin content but very little destruction of Vitamin A.

The destruction curves for the bacteriological population may be reproduced by assuming a mixture of bacteria, each species of which undergoes a lethal action that may be described mathematically as a first order chemical reaction. Dosages over 40,000 R resulted in the destruction of more than 90% of the microorganisms; 146,000 R was sufficient to destroy 99.5% of the organisms that could be detected by standard plate counts.

The results obtained in the above experiments have fulfilled the primary objectives sufficiently to indicate the advisability of continuing these researches. Work on the nature of spoilage and of the chemical changes in irradiated foods and the possible effect of irradiation on nutritional factors are now under investigation.

Acknowledgment

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New Foods for Institutional Users[a]

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The need for development of food products which are prefabricated, processed, treated, or packaged in a manner to provide more accurate control by restaurants over inventories, portions, and labor costs are discussed. Type of foods answering the needs of institutional users are cited together with the advantages they provide. Possible future lines of development for further improvements in such foods are mentioned.

The rapid rise in food costs during the past year, together with steadily advancing labor costs, point an important need for more rapid development of products prefabricated for institutional use, processed, treated, or packaged in a manner to facilitate more accurate control over inventories, to provide better control over portions, and to reduce labor costs. There is also great need for the development of cooking apparatus which will conserve labor and fuel, and for accurate and durable instruments on that equipment to control heat transfer. There is also substantial need for more scientific information on cooking procedures.

An understanding of the magnitude and scope of the public feeding industry will serve to emphasize its importance to the health and general welfare of the American people. Today there are about 525,000 public feeding establishments in operation in the country, employing one out of every six workers in the retail fields. This twelve billion dollar industry, feeding upwards of a hundred million meals per day, provides our citizens with about a quarter of all food consumed by them. In so far as food effects health, vigor, morale, and general welfare, the operators of public feeding establishments must accept a fourth of the responsibility for such effects, good or bad.

Public food service is essentially a manufacturing industry but with added requirements for individual service to patrons, public relations, the provision of satisfactory and comfortable surroundings, and the maintenance of a rigid sanitation program. Unlike other manufacturing industries, however, it has a low investment in labor-saving devices. In the steel, automotive, textile, and chemical industries the investment in automatic machinery runs from $5,000 to $10,000 per worker. In the restaurant it is less than one thousand. Practically every dish served to a patron must have the personal touch of a skilled smployee. The pound output per man-hour is, therefore, low and the cost high.

Cost accounting in most establishments is broken down into the three broad categories: food costs, which includes the cost of feeding employees; labor costs; and overhead. Through many years it has been found that food costs should not greatly exceed 42% of the sales dollar; and that labor costs should be kept below 30%. If the two combined exceed 75% then the business will probably fail because the fixed and variable overhead will always hover around 25%.

It would appear that the simple answer to the problem of rising costs is to advance menu prices. But actually it is not so simple. Without volume a restaurant cannot remain in business. One of the surest ways of losing volume is to increase menu prices. One of the peculiarities of the industry is its inability to radically change its menu prices, either up or down, without losing most of its established clientele. The operator cannot possibly raise menu prices, or lower them with the fluctuating price of food with the speed at which other retailers of merchandise change theirs. The retail grocery industry were able to raise the price of coffee in step with advancing wholesale prices. It took months for restaurant operators to get up courage to change the price of coffee from five to ten cents per cup. Many establishments, after more than a year of high coffee prices, are still selling coffee at a loss because they know that their total sales volume will decline if

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coffee is advanced to ten cents. The operator therefore, seeks ways and means of reducing both food and labor costs through greater efficiency, elimination of waste, better portion control, and better performance in equipment, rather than by advancing menu prices.

Several interesting time-motion studies have been made in retaurant kitchens, resulting in the adoption by many operators of layouts which reduce the number of steps, arm motion, load lifting, eye strain, and fatigue of employees.

Another and highly important approach to the reduction of labor costs is through the purchase of partially prepared foodstuffs such as commercially peeled potatoes and apples, fabricated cuts of meat and poultry, fish fillets, and prepared mixtures for bakery products and desserts. An outstanding example of this type of food is the high quality frozen orange concentrate developed by food technologists and engineers a few years ago. Time, and therefore expense, required to receive, store, uncrate and squeeze oranges; to wash equipment and dispose of waste material is many times that required to handle the frozen concentrate. To its credit as a labor-saver, can be added uniformity of quality, saving of storage space, elimination of spoilage loss, and happier employees.

Considerable research has been conducted during the past few years on fabricating meat for the retail trade. Some work has been done in the same field for institutional use. Several packers and restaurant supply companies are now cutting, freezing, and packaging minute, strip loin, tenderloin, and swiss steaks, hamburgers, pork chops, veal cutlets, sliced liver, stew meat, and roasts. There are still many problems to be solved before fabricated meats become standard and reach nation-wide distribution. Labeling, for example, is a matter of great importance; not only must it be honest as to type and quality, but it also should be informative and instructive. Packaging to prevent surface discoloring, freezer burn, and dehydration is another problem. The benefits of this work are apparent. Excess bones and trimmings represent little or no value at the consuming end but do have value of importance at the point of production. Elimination of this useless material also saves expensive transportation and packaging costs. It is removed by the fabricator in a factory-type process where labor-saving machinery and packaging equipment are available. The labor cost would be much greater in an institution not so equipped.

There is constant growing use of eviscerated and cut-up poultry in restaurants. One large organization purchases carlot quantities of broilers cut-up and ready to cook. Each shipment has excellent uniformity of quality and each portion is within a fraction of an ounce of the weight of every other similar portion. Upon delivery, the shipment is picked up on inventory as portions, rather than pounds, providing perfect stock control and the prefabrication provides perfect portion control.

The bone blackening problem in young tender broilers and fryers is well recognized. While the blackening has no adverse effect upon eating quality, it causes considerable trouble to restaurant operators who have to explain to frightened or angry customers that the meat is not spoiled and that the discoloration does not affect quality. This has, of course, made frozen broilers unpopular with some restaurant men. This problem has been solved by partially cooking the chicken before freezing. The meat is thoroughly cooked but the skin and surface are not browned. Bones of cooked broilers do not discolor. Thus solid frozen precooked chicken can be finished under a broiler in less than ten minutes and when thawed it can be finished and served in less than five minutes. Here again is an important time and labor-saving device destined to grow in popularity.

A recent start has been made on fabricated turkey. The breast and thigh meat, which are the cuts normally used in restaurants for slicing, can be satisfactorily cooked by braising. The balance of the bird is ordinarily cooked by simmering and used for salads, croquettes and similar dishes. The thighs and breasts of four turkeys can be braised in one pan in 1½ hours. The balance of the birds can be simmered in one stock pot in the same time. Oven roasting takes 4½ hours and one large bake pan per bird. There is now on the market a pre-cooked boneless turkey molded into cylindrical form which is excellent for machine slicing and very usable for sandwich work.

Frozen fish fillets have been on the market for years and are extensively used by institutions. This service could be extended by development of frozen and glazed individual portions of brook trout, Dover sole and other similar items. The big trouble with fish service is lack of freshness in off-shore fish held several days in ice before the fishing boat unloads. This fault has been and is distinctly retarding the volume which the fishing industry could have. Some effort has been made to equip fishing craft with mechanical refrigeration. The use of germicidal ice may also help to preserve long-held fish. But there is much room for improvement in the off-shore handling of fish at this time.

One company on the gulf coast has been doing a good job on breaded-raw shrimp, frozen and ready for deep frying. Another development now under way is the dehydration of cooked shrimp by sublimation. Samples of this product indicate that the process has great possibilities.

Frozen fruits and vegetables offer a very important means of reducing kitchen labor and storage space. Such products are extensively used by institutions. Unfortunately the quality of some of the items packed for institutional use is far from satisfactory. A number of operators have reported that they have entirely discontinued use of frozen peas, spinach, broccoli, apricots, and other items because they cannot use the low quality packed for institutional use. Others have turned to consumer size packages to obtain the desired quality. This is, happily, not a universal complaint, but it is a condition which should be given heed by all freezers who desire restaurant business.

Shell eggs are universally used for all purposes in restaurants at the present time. Since eggs are a seasonal item, they either are abundant or scarce, and during part of the year are supplied from storage. The baking industry and other food manufacturing industries make extensive use of frozen eggs. Ten, twelve, and thirty pound packages, especially designed for these industries, have been developed. The quality of the product is all that is needed by them. There is a vast field waiting in the great public feeding industry for some one who will develop table quality, pasteurized frozen eggs, packed in No. 2½ or 3 cans. A 10 pound or larger can could not be economically used by most small or medium sized restaurants. It will also be necessary to provide a device which will quickly shave out the contents of a small can in the form of slush-ice. There is no reason why most of the peaks and valleys of egg production should not be leveled by a freezing pro-

gram designed for restaurant trade. If we can afford to use small cans for fruits, vegetables and cereals, we certainly can use them for protein foods such as eggs. This type of production might indeed lead to the freezing of individual eggs in trays similar to those used for ice cubes.

Fluid milk in either fibre or glass quart containers is used for cooking as well as beverage purposes in most restaurants. A high quality spray-dried skim milk powder, sub-packaged in quantity proper for reconstitution into a gallon of fluid milk, could be advantageously used in restaurants. Its use would reduce food costs, save space and provide a means of maintaining an adequate stock for all cooking purposes. The new frozen milk concentrate now in its infancy will become a highly important item for restaurant use.

Potatoes, one of the more important food items, are being marketed in about the same manner today as they were a generation ago. Considerable information is now available about their cooking quality as related to physical characteristics, but this is not being applied to the sales of potatoes. It is known that potatoes of high specific gravity are high in starch and, therefore, apt to be good for baking or mashing. A machine has been devised for a brine flotation separation of high and low specific gravity tubers, but it has not yet been commercially adopted. Potato chip manufacturers have learned the importance of treating storage potatoes to reduce the sugar content and many distributors now specialize in potatoes conditioned for the chip industry. But this is not being done for restaurant users who find it difficult to obtain potatoes suitable for deep frying after the first of each year because of the high sugar content developed in cold storage potatoes. Most operators find it necessary to serve mashed potatoes in their restaurants the year around. New potatoes are not suitable for mashing. So there is a period from the end of old potato storage, through early potato harvest when it is very difficult to provide patrons with good mashed potatoes. A good dehydrated granulated potato made from high specific gravity tubers would solve this problem. A number of companies are now commercially peeling potatoes for institutions. The potatoes are treated by sulphiting, or otherwise, to delay discoloration. This is a valuable service as it substantially reduces labor costs, but so far as is known, none of these companies are attempting to desugar or to determine specific gravity prior to delivery. Here, indeed, is an opportunity for the application of technology.

Pie apples are important to restaurants. Most operators try to use fresh apples because they hold the opinion that part of the typical fresh apple flavor and aroma is missing in the canned, frozen, or dehydrated product. But every variety of apple has a limit to its storage life and, therefore, apples satisfactory for pie work are not available for several months each year. If a good and stable apple essence were available, which could be used to bring canned or frozen apples to the flavor level of fresh pie apples, the problem would be solved.

The improvement in quality of fresh vegetables by precooling and proper packaging is well known. One large Florida company last year distributed 2½ million consumer packages of fresh sweet corn handled in this manner. The market is wide open for some company to provide institutional sized packages of such corn to restaurants. The same applies to all other items of fresh produce, especially lettuce, cauliflower, broccoli, and similar items.

It is known that melons, grapes, and tomatoes do not develop sugar after harvest. Yet the big bulk of these items, and especially tomatoes, are harvested and marketed green to reduce shipping losses. Great quantities of tomatoes are imported each year which can never have the attractive flavor of vine-ripened tomatoes. What a wonderful contribution will be made to all of the public feeding industry by the food technologist who succeeds in freezing vine-ripened tomatoes, and what a fortune is in store for him.

New canning techniques in the so-called "heat-fill-seal" method hold great promise. Institutions use frozen products because they believe them to more closely resemble the fresh foods than do the canned items. Certainly a canned product requiring no refrigeration, or at least no frozen storage, would promptly be adopted if the quality could be made equal to or better than the frozen product in flavor and color.

Baking powder and yeast-leavened mixtures for bakery products are extensively used. Items containing egg powder could be improved, either through the use of table quality egg powder or by removing it from the mix entirely and permitting the restaurant man to add fresh eggs. Pancake, waffle and doughnut mixtures are not only labor-savers, but also provide continuous uniformity of quality. The same applies to several types of dessert powders.

There are other classes of foodstuffs which could be improved by different and better processing or packaging methods; and there is great need for more scientific knowledge on cooking procedures.

In closing, it is proper to again emphasize that the huge public feeding industry is essentially a manufacturing operation in which raw materials are converted into edible foods in a manufacturing cycle which is reduced to hours or even to minutes; that it is not well equipped with labor-saving machinery and must look to food processors for supplies which will reduce its labor costs and improve its position in controlling food costs. It appears to offer a wide-open field for greater application of technology and a great challenge to food technologists.

Treatment of Berry Boxes (Hallocks) to Reduce Mold Growth

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A method is presented for the treatment of berry boxes to reduce mold growth. Recommended treatment consists of dipping new air-dry boxes into a molten wax mixture consisting of 95% paraffine wax (m.p. 143-150° F.) and 5% microcrystalline wax (m.p. 160-165° F.) at 160° ± 2° for 15 seconds. Design of simple, inexpensive equipment for accomplishing the treatment is described. Estimates of probable costs and savings are shown. Use of certain fungicidal agents prior to or during the wax treatment affords slight or no improvement in mold reduction.

In the Pacific Northwest berry growers and processors are confronted with the serious problem of mold growth on berry boxes (hallocks). Since these hallocks are used repeatedly for the harvesting of the fruit and its transportation to the processing plants, they soon are heavily contaminated by berry juices and by field soil and other forms of dirt. It is common practice in the industry to wash the hallocks prior to their return to the grower. In some instances they are subjected to a further treatment with hypochlorite solution or steam in an attempt to sterilize them. While such treatments do afford some improvement they do not effectively remove the main sources of the trouble, namely, the juice which is absorbed by the wood and the berry pulp which adheres to the surfaces of the hallock. This results in almost ideal conditions for the rapid growth of mold, such as high moisture content, favorable temperature, and ample food supply. As a consequence the hallocks undergo rapid deterioration and require replacement at the end of each season. Under extremely adverse conditions replacement during a given season has been found necessary. In addition, such hallocks are largely responsible for the direct molding of the fruit itself. The resulting financial losses are of major concern to the berry processing industry.

Some conception as to the magnitude of the problem may be had from a consideration of the hallock requirements of typical processing plants. A small concern will normally prepare for a given season about 100,000 hallocks; a large processor may stock as many as 2,000,000. It is estimated that the total yearly hallock requirement in the states of Washington, Oregon, and Utah is well over 30 million and represents an annual expenditure of some $450,000.00. The average total cost for hallocks is 1.5 cents each, of which amount 50% represents the raw material cost and 50% the fabrication cost.

It is difficult to estimate the monetary value of the fruit loss directly attributable to mold-infested hallocks. Such losses are closely associated with the prevailing weather conditions. During the 1948 season, when wet weather prevailed, the losses due to moldy fruit were enormous. On the other hand, the losses during 1949, a dry season, were not so serious. Most processors agree that even under the best of conditions the cost of fruit loss due to moldy hallocks exceeds the hallock investment costs.

In addition to sterilization and steam cleaning of hallocks after each use, processors have tried other means of reducing mold growth on the containers. One method which has been used in the Pacific Northwest involves dipping the hallocks into a molten wax bath to form a surface film impervious to berry juices. Until recently this method was used in only a few plants since difficulties experienced by a small number of processors who tried the treatment before proper conditions of application were established discouraged wider use.

This report covers the work done to perfect the techniques and procedures for applying the wax coating by the dipping of hallocks into molten wax, and to evaluate by laboratory tests the effectiveness of the wax film in preventing mold growth. Studies were also made to determine the type of wax necessary for satisfactory treatment, the amount of wax pickup, the water repellency and soil pickup characteristics of the treated hallocks, and the effect of an additional treatment with fungicidal agents. Unless otherwise indicated, all tabulated data are based on duplicate determinations.

EXPERIMENTAL

Wax pickup studies. In this phase of the investigation all hallocks were formed from wet shook and then dried to equilibrium conditions. The dry hallocks were hand-dipped in molten waxes, maintained at 15°, 30°, and 45° F. (8.3°, 16.6°, and 25° C.) above the respective initial melting points of the wax and for periods of 5, 10, and 15 seconds. After withdrawal from the wax bath the hallocks were allowed to drain free of excess wax and to cool sufficiently to congeal the wax. The results, showing effect of type of wax, dip time, and dip temperature upon wax pickup, are shown in Table 1. It will be noted that in general the wax pickup tends to 1, increase as the melting point of the wax increases; 2, decrease as the dip temperature increases; 3, decrease as the dip time increases at low dip temperature and to increase at the higher dip temperatures; and 4, decrease when wax mixtures are used.

Cooling times. The time necessary for the wax coating to drain free of excess wax and to cool sufficiently to permit handling was investigated in conjunction with the wax pickup studies. The results, showing the effect of type of wax, dip time, and dip temperature, are shown in Table 2. As might be inferred from a consideration of the conditions employed, the table shows that the cooling time increases as the dip temperature and the dip time increase and decreases as the melting point of the wax increases. The cooling times for the wax mixtures employed are significantly higher than

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TABLE 1

Effect of type of wax, dip temperature, and dip time on wax pickup by berry hallocks

Type of wax [b]	Dip time	Wax pickup	Dip time	Wax pickup	Dip time	Wax pickup
	Wax bath temperature 15° F. above wax m.p.					
	sec.	*g.*	*sec.*	*g.*	*sec.*	*g.*
A	5	15.9	10	16.4	15	15.9
B	5	18.6	10	19.0	15	18.5
C	5	24.5	10	18.5	15	16.7
D	5	55.1	10	52.7	15	.....
E	5	14.5	10	13.8	15	14.4
F	5	18.7	10	15.7	15	15.3
G	5	16.9	10	15.9	15	15.0
H	5	18.4	10	15.9	15	15.7
	Wax bath temperature 30° F. above wax m.p.					
A	5	14.3	10	13.8	15	14.0
B	5	15.4	10	15.0	15	15.8
C	5	13.7	10	16.3	15	14.7
D	5	19.3	10	20.2	15	20.1
E	5	12.1	10	11.6	15	13.4
F	5	12.8	10	13.6	15	12.6
G	5	12.5	10	13.8	15	13.6
H	5	13.2	10	12.3	15	13.0
	Wax bath temperature 45° F. above wax m.p.					
A	5	12.3	10	13.4	15	12.8
B	5	14.0	10	13.0	15	16.1
C	5	15.6	10	17.0	15	16.5
D	5	17.0	10	16.5	15	16.6
E	5	12.0	10	12.2	15	13.5
F	5	10.9	10	11.1	15	10.9
G	5	12.4	10	12.5	15	12.2
H	5	12.2	10	12.2	15	13.3

[b] A is paraffin wax, m.p. 125-130° F.; B is paraffin wax, m.p. 143-150° F.; C is paraffin wax, m.p. 160-165° F.; D is microcrystalline wax, m.p. 160-165° F.; E is 95%A, 5%D; F is 90%A, 10% D; G is 95% B, 5% D; and H is 90% B, 5%D.

TABLE 2

Effect of type of wax, dip temperature, and dip time on cooling time of waxed hallocks

Type of wax [c]	Dip time	Cooling time	Dip time	Cooling time	Dip time	Cooling time
	Wax bath temperature 15° F. above wax m.p.					
	sec.	*sec.*	*sec.*	*sec.*	*sec.*	*sec.*
A	5	30.5	10	37.5	15	48.0
B	5	27.5	10	26.5	15	34.5
C	5	20.0	10	28.0	15	38.0
D	5	12.5	10	27.5	15	28.5
E	5	32.5	10	44.0	15	49.0
F	5	41.0	10	61.5	15	73.5
G	5	33.5	10	32.0	15	36.0
H	5	28.0	10	33.5	15	40.5
	Wax bath temperature 30° F. above wax m.p.					
A	5	61.5	10	58.5	15	59.5
B	5	46.0	10	47.5	15	50.0
C	5	39.5	10	40.5	15	44.0
D	5	27.5	10	28.5	15	37.0
E	5	63.5	10	77.5	15	95.5
F	5	73.5	10	79.5	15	94.0
G	5	54.5	10	62.5	15	64.5
H	5	68.5	10	66.0	15	70.0
	Wax bath temperature 45° F. above wax m.p.					
A	5	49.5	10	52.5	15	55.5
B	5	48.5	10	48.5	15	44.5
C	5	47.5	10	46.0	15	42.0
D	5	42.5	10	48.5	15	55.0
E	5	76.0	10	79.5	15	92.5
F	5	87.5	10	93.0	15	95.0
G	5	62.0	10	71.0	15	81.5
H	5	71.5	10	82.0	15	91.5

[c] See footnote b, Table 1.

for the component waxes at corresponding dip temperatures and times.

Water pickup. Since one of the prerequisites of a satisfactorily treated hallock is its ability to reduce the absorption of water, fruit juices, and similar liquids, the water-repellent properties of the waxed hallocks were determined. For this purpose the cold, treated hallocks were immersed in water at room temperature for a period of one hour. The water pickup was obtained by weight difference. Table 3 shows the influence of type

TABLE 3

Effect of type of wax, dip temperature, and dip time on water pickup by waxed hallocks

Type of wax [d]	Dip time [e]	Water pickup [f]	Dip time	Water pickup	Dip time	Water pickup
	Waxed hallocks					
	Wax bath temperature 15° F. above wax m.p.					
	sec.	*g.*	*sec.*	*g.*	*sec.*	*g.*
A	5	2.2	10	2.1	15	2.5
B	5	1.4	10	1.7	15	1.3
C	5	0.8	10	1.6	15	1.8
D	5	2.5	10	0.3	15	1.2
E	5	1.4	10	1.5	15	1.7
F	5	0.8	10	0.7	15	0.9
G	5	2.0	10	1.7	15	1.1
H	5	2.6	10	1.8	15	1.9
	Wax bath temperature 30° F. above wax m.p.					
A	5	3.8	10	3.5	15	4.7
B	5	2.7	10	3.2	15	2.8
C	5	4.1	10	3.4	15	4.0
D	5	1.2	10	1.2	15	1.2
E	5	3.8	10	3.8	15	4.2
F	5	3.5	10	4.1	15	3.7
G	5	4.2	10	4.0	15	4.4
H	5	3.2	10	3.3	15	3.9
	Wax bath temperature 45° F. above wax m.p.					
A	5	5.3	10	5.2	15	5.4
B	5	4.4	10	4.0	15	3.7
C	5	4.7	10	5.8	15	5.7
D	5	2.9	10	2.7	15	2.4
E	5	4.6	10	4.6	15	4.9
F	5	5.0	10	5.8	15	6.2
G	5	5.5	10	5.2	15	5.0
H	5	7.4	10	7.0	15	7.3

Unwaxed hallocks

Soak time	H_2O pickup, g./hallock [g]
30 min.	12.2
60 min.	13.8
120 min.	15.2
19 hrs.	22.1

[d] See footnote b, Table 1.
[e] Wax dip time.
[f] After immersion in water for 1 hour.
[g] Average of six determinations.

of wax, dip time, and dip temperature upon the property of water repellency. The table also shows the water absorbed by untreated hallocks when immersed for various periods. The microcrystalline wax dip obviously affords the best protection against water penetration. The time of dip in the wax appears to have no significant effect; low dip temperatures, however, are more desirable than the higher temperatures.

MECHANICAL AND PHYSICAL PROPERTIES OF WAXED HALLOCKS

In addition to the resistance to water or juice absorption afforded by the wax, the treatment should not adversely affect certain mechanical and physical properties of the hallocks. Untreated hallocks are inherently fragile and therefore susceptible to mechanical damage. All of the wax treatments improved the mechanical strength, perhaps because of the bonding action of the wax at overlaps and general stiffening of the wood fibers. This is confirmed by reports from processors who have employed the wax treatment process.

Soil pickup properties. Clean, dry, untreated hallocks pick up negligible amounts of field soil. However, reused, untreated hallocks contaminated with berry juice, adhering pulp, and wash water pick up field soil in appreciable amounts and thereby contribute to the fruit washing problems at the processing plant. The wax treatment prevents contamination by the sources mentioned above, provided that washing of the hallocks prior to their return to the fields is properly conducted. Increased soil pickup by the waxed hallocks when exposed to temperatures sufficently high to soften or melt the wax is a possibility. Tests were therefore conducted to determine the seriousness of this problem. Under simulated field conditions wherein waxed hallocks were held in contact with fine sand for one hour at 100° F. (38° C.), the soil pickup characteristics of each wax or wax mixture were evaluated. Table 4

TABLE 4

Effect of type of wax, dip temperature, and dip time on soil pickup by waxed hallocks

Type of wax [b]	Dip time	Soil pickup [1]	Dip time	Soil pickup	Dip time	Soil pickup
	Wax bath temperature 15° F. above wax m.p.					
	sec.	*g.*	*sec.*	*g.*	*sec.*	*g.*
A	5	0.28	10	0.35	15	0.31
B	5	0.04	10	0.03	15	0.03
C	5	0.00	10	0.00	15	0.00
D	5	0.14	10	0.22	15	0.21
E	5	0.65	10	0.72	15	0.63
F	5	0.64	10	0.63	15	0.53
G	5	0.12	10	0.04	15	0.09
H	5	0.06	10	0.09	15	0.10
	Wax bath temperature 30° F. above wax m.p.					
A	5	0.33	10	0.26	15	0.28
B	5	0.08	10	0.04	15	0.06
C	5	0.00	10	0.00	15	0.00
D	5	0.21	10	0.13	15	0.18
E	5	0.56	10	0.53	15	0.56
F	5	0.55	10	0.45	15	0.54
G	5	0.11	10	0.12	15	0.10
H	5	0.08	10	0.10	15	0.10
	Wax bath temperature 45° F. above wax m.p.					
A	5	0.10	10	0.05	15	0.07
B	5	0.06	10	0.06	15	0.05
C	5	0.00	10	0.00	15	0.00
D	5	0.10	10	0.10	15	0.13
E	5	0.28	10	0.29	15	0.32
F	5	0.31	10	0.39	15	0.38
G	5	0.09	10	0.05	15	0.02
H	5	0.16	10	0.15	15	0.10

[b] See footnote b, Table 1.
[1] Soil pickup by clean unwaxed hallocks was nil.

shows the effect of type of wax, time of dip, and dip temperature on the soil pickup property. The results indicate that 1, the lower the melting point of the paraffin wax, the greater is the amount of soil pickup; 2, the microcrystalline wax retains more soil than does the paraffin wax with corresponding melting point; 3, the dip time at any given temperature has no significant effect; and that 4, the wax mixtures pick up more soil than do the paraffin waxes under corresponding conditions of dip time and temperature.

The paraffin or mixed wax treatment produces clean, smooth hallocks with slightly deeper color than the originals. The microcrystalline wax treatment produces hallocks that possess a distinct tackiness, which is not true with paraffin and mixed wax coatings.

MOLD GROWTH STUDIES

Mold growth on original and treated hallock material was determined by inoculating with berry puree which had been heavily seeded with spores of several different molds isolated from moldy berries. The mold cultures were obtained by plating moldy berries on potato dextrose agar and blending the growth from the surface of two plates in about 200 ml. of berry puree. To this puree-mold stock was added sufficient puree to produce two liters of inoculating medium. The test samples were infected by dipping into the inoculum and withdrawing immediately.

In early experiments the inoculated hallock sections were allowed to stand in a humid chamber at room temperature until mold appeared on the surface. The test samples were then rinsed with a strong water spray, placed in another moist chamber, and incubated for a period of five to seven days, and observations were made on the degree of molding. In succeeding tests the procedure was changed so that the test samples were inoculated as before, allowed to stand for one hour, rinsed with water and then incubated for a period of five to seven days. Equally satisfactory results were obtained and the total time was materially reduced.

After incubation, the samples were examined and the growth of molds was recorded as slight, moderate, heavy, or very heavy according to the degree of growth on the surface.

Plating procedure. For more quantitative data, plate counts were made. Immediately after incubation a definite area, 20 sq. inches from each hallock and 10 sq. inches from each section, was swabbed with a sterile moist swab. The swab was firmly brushed over the surface 100 times and the tip then broken off and dropped into a bottle containing 100 ml. of sterile water. The bottle was capped and shaken vigorously 100 times to distribute the mold spores uniformly. Suitable dilutions were made in sterile water and 1 ml. aliquots were planted on Czapek's agar. The plates were incubated at room temperature 77.0-80.6° F. (25-27° C.) and mold counts made after 24 and 48 hours of incubation. Often the 48-hour count could not be made, since the mold colonies had completely overgrown the plates. Results were recorded as mold spores per sq. inch of surface.

Results of mold studies. The relative effectiveness of the various wax coatings in protecting against mold growth is demonstrated in Table 5. In general, the table shows a slight trend favoring the waxes with higher melting points. A dip temperature approximately fifteen degrees above the melting point of the wax or mixture affords the best results. Mixtures of paraffin and microcrystalline waxes were somewhat better than the straight paraffin wax.

Fungicide treatment. Several types of fungicides were tested. The compounds included a copper soap, the zinc salt of a high-molecular-weight alkyl-sulphate, alkyl dimethyl benzyl ammonium chloride, trimethyl cetyl ammonium pentachlorphenate and sodium orthophenylphenate. When the above agents, in the form of aqueous or petroleum solvent solutions, were applied to the hallocks prior to waxing, only the copper and zinc fungicides showed slightly improved resistance to mold growth over the simple wax treatment. Since the two fungicides are soluble in the waxes employed, further tests were conducted to establish their merits if applied as wax-fungicide solutions.

The results of mold spore counts on hallocks subjected to copper and zinc fungicide in wax treatment and made by the swabbing and plating procedure previously described are given in Table 6. Table 7 presents results of tests on replicate hallocks given various wax and fungicide-wax treatments as compared with uncoated hallocks.

TABLE 5

Effect of type of wax, dip temperature, and dip time on reduction of mold growth on waxed hallocks

Type of wax [j]	Dip time	Mold growth [k]	Dip time	Mold growth	Dip time	Mold growth
Wax bath temperature 15° F. above wax m.p.						
	sec.		*sec.*		*sec.*	
A	5	8	10	8	15	8
B	5	6	10	6	15	10
C	5	1	10	10	15	10
D	5	...	10	1	15	...
E	5	10	10	10	15	10
F	5	1	10	1	15	1
G	5	1	10	1	15	5
H	5	10	10	10	15	10
Wax bath temperature 30° F. above wax m.p.						
A	5	20	10	30	15	30
B	5	20	10	20	15	20
C	5	10	10	20	15	20
D	5	8	10	10	15	10
E	5	10	10	10	15	10
F	5	20	10	20	15	20
G	5	20	10	20	15	20
H	5	10	10	10	15	20
Wax bath temperature 45° F. above wax m.p.						
A	5	20	10	20	15	20
B	5	30	10	20	15	20
C	5	30	10	30	15	30
D	5	20	10	10	15	20
E	5	10	10	10	15	20
F	5	20	10	20	15	20
G	5	25	10	20	15	20
H	5	20	10	20	15	10

[j] See footnote b, Table 1.

[k] Zero indicates no growth; 10, slight growth; 20, moderate growth; 30, heavy growth; and 40, very heavy growth. Mold growth on the controls without treatment was 40.

The latter table shows the great advantage that is obtained by wax treatment and likewise the relatively small improvement by the additional use of fungicides. The mold counts on inoculated-unwashed and inoculated-washed hallocks (Groups II and III) are approximately 160 and 50 times the counts on the wax-treated (Groups IV and V). The addition of the zinc fungicide (Group VII) does afford a further reduction in mold development but the improvement may not justify the added expense. The copper soap (Group VI) affords little or no additional protection.

TABLE 6

Mold growth on hallocks treated with waxes containing copper [l] and zinc [m] fungicides

Type of wax [n]	Dip temp.	Dip time	Cu soap	Mold count [o]	Zn fungicide	Mold count
	° *F.*	*sec.*	%		%	
A	140	15	0.25	3400	0.50	3200
A	140	15	0.50	3000	1.00	2600
A	140	15	0.75	2300	2.00	7300
A	140	15	1.00	2600	4.00	2800
A	140	15	.....	.....	8.00	4400
B	158	15	0.25	.....	0.375	3300
B	158	15	0.50	3200	0.750	4400
B	158	15	0.75	2500	1.50	2100
B	158	15	1.00	2400	3.00	1300
B	158	15	.....	.....	6.00	900

[l] Copper soap prepared by reacting ordinary soap and copper sulphate solutions, washing, filtering, and drying.

[m] Zinc salt of a high-molecular-weight alkyl sulphate.

[n] See footnote b, Table 1.

[o] Mold count per square inch of hallock surface grown on Czapek's agar plates incubated for 24 hours.

The initial appearance of unwaxed and wax treated hallocks is shown in the upper half of Figure 1. The lower half shows the appearance of the corresponding hallocks after one season's use.

Recommendations for hallock treatment. After consideration of the relative advantages obtained by the employment of the various waxes and dipping conditions, the 95% refined paraffin wax (m.p. 143-150° F.) and 5% micro-crystalline wax (m.p. 160-165° F.) mixture was judged to be the most satisfactory. This mixture produces a wax film which has excellent resistance to water and berry juice penetration, possesses a melting point well above normal field temperatures, and has sufficient pliability to resist cracking or flaking. Such a coating does not pick up excessive amounts of dirt but does afford excellent protection, against mold development. The cost of such a treatment is low.

TABLE 7

Mold growth on hallocks subjected to various treatments

Group	Type of wax [p]	Dip temp.	Dip time	Wax pickup	Mold count per in.[q]		Hallock treatment
					24 hour	48 hour	
I	None	° *F.*	*sec.*	%	6,000	11,300	Original unwaxed hallocks, soaked in tap water. Incubated in humid-chamber at room temperature for 7 days.
II	None	.....	.....	.....	590,000	884,000	Original unwaxed hallocks, dipped in mold-inoculated berry puree. Allowed to stand for 1 hour and incubated as above.
III	None	.....	.....	.....	167,000	181,000	Original unwaxed hallocks, dipped in mold-inoculated berry puree. Allowed to stand one hour, washed with water spray and incubated as above.
IV	G	158	15	16.7	3,700	overgrown	Waxed hallocks, dipped in mold-inoculated berry puree. Allowed to stand one hour, washed with water, and incubated as above.
V	G	188/158	15/60	17.0	3,800	overgrown	Double waxed hallocks, 1st wax dip at 188° F. for 15 seconds, 2nd wax dip at 158° F. for 60 seconds. Dipped in berry puree, washed and incubated as above.
VI	G	158	15	18.0	3,400	overgrown	Hallocks singe-dipped in wax containing 0.50% copper soap. Subsequent treatment as above.
VII	G	158	15	15.7	1,900	2,200	Hallocks single-dipped in wax containing 1% zinc fungicide. Subsequent treatment as above.

[p] See footnote b, Table 1.

[q] Five hallocks employed in each group. Mold counts are average values.

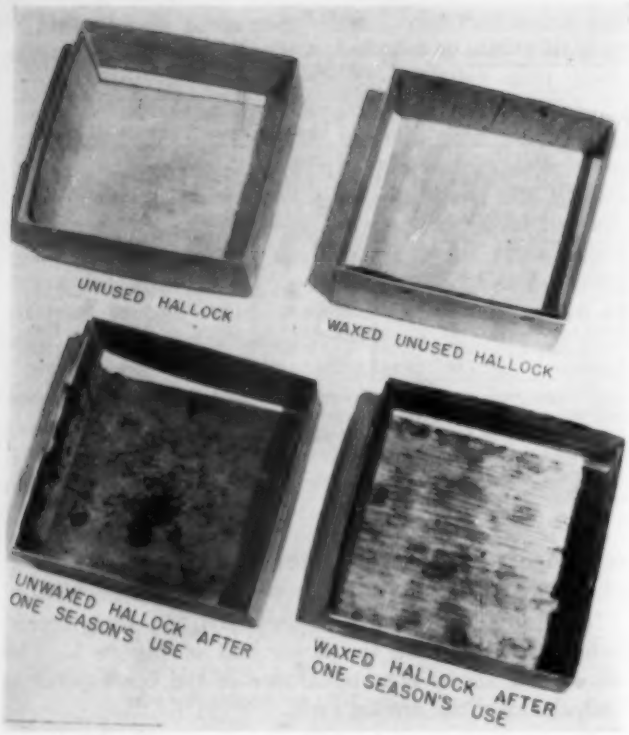

FIGURE 1. Appearance of unwaxed and waxed hallocks when made and after one season's use.

In order to obtain optimum results, the hallocks must be air dry prior to the treatment when a single-dip operation is employed. They should be reasonably free of loose sawdust, wood fibers, and other foreign matter. The temperature of the molten wax bath should be 15° to 20° F. above the melting point of the mixture. Too low a temperature produces an excessively heavy film, whereas at higher dipping temperatures the resulting film becomes too thin to serve as an effective water or juice barrier.

The time of dip should not be less than 15 seconds. If shorter times are employed, the wood stock is not heated sufficiently to allow adequate drainage of excess wax and the elimination of trapped and absorbed air is incomplete. The coatings are therefore excessively heavy and non-uniform. Dip times of more than 15-20 seconds offer no advantage, since the amount of wax retained does not change significantly at longer exposures.

After emergence from the molten wax, the hallocks must be allowed to drain free of excess wax and to cool to such a degree that they may be handled without damage to the film or coating. Under normal room temperature conditions (74-76° F.) the cooling time will not exceed 40 seconds.

Design of wax dipping machine. Equipment for the waxing of berry hallocks must be capable of performing under the conditions specified above and produce satisfactory results. Such equipment can be constructed of ordinary readily available materials at a low total cost. For the average medium-sized processing plant, manual operation is adequate; for large-scale operations a completely mechanized unit would be more satisfactory. In either case the dipping equipment will consist of melting and dipping tanks, a means for immersing the hallocks and removing them from the molten wax, a source of heat, and adequate temperature controls.

Manually operated wax-dipping equipment designed at the Western Regional Research Laboratory is illustrated in Figure 2.[r] The unit is capable of treating

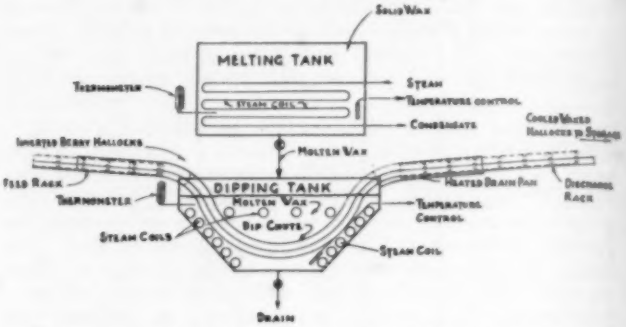

FIGURE 2. Schematic diagram of a steam-heated hallock dipping machine.

either 7 or 14 hundred hallocks per hour and requires 3 or 5 operators, respectively. At the lower rate, the wax consumption will be about 26 pounds per hour and at the higher rate, 52 pounds per hour. The wax mixture is prepared, melted, and preheated in an elevated tank whose capacity is sufficient for a day's operation at the lower rate. The molten wax flows at a controlled rate into the lower dipping tank. Air-dry hallocks are placed manually into the feed end of a dipping chute and pushed through the molten wax to the discharge end, where they are removed and placed into flats.

The melting and dipping tanks can be provided with either steam or electrical heat. About 20,000 B.t.u. are required in the melting tank to melt and preheat the wax charge to the desired temperature. The dipping tank's heat requirements are only 8,000 B.t.u. hour and suffice for heat pickup by the cold hallocks and for heat losses from that portion of the system. The heat source may again be either steam or electrical. Both tanks are provided with suitable automatic temperature controls. Insulation of the exposed tank surfaces is recommended in order to reduce heat losses.

The cost of the dipping machine is estimated to be in the range of $500 to $750.

Cost estimates. The cost of untreated hallocks at the present time is about $15.00 per thousand, divided equally between material and labor costs. When the hallocks are treated as recommended, the wax requirements are 36 pounds per thousand. Assuming that the refined paraffin wax is available at 9.8 cents per pound, the microcrystalline wax at 15.5 cents per pound and allowing 5% for losses, the wax cost will be $3.80 per thousand.

Labor costs, chargeable to the treatment, will vary and be dependent upon such factors as plant orientation, equipment design, mechanization, and type of labor available. If, however, the dipping equipment is of the type described and three operators are employed as suggested, then the labor, upkeep, depreciation and

[r] Drawings with sufficient detail and instructions to allow fabrication in an ordinary mechanical shop are available on request to the Western Regional Research Laboratory, Albany, California.

other incidental costs will be approximately $7.50 per thousand. The total cost of waxed hallocks will be $26.30 per thousand.

Advantages gained by wax treatment. It is obvious that the wax treatment materially increases the cost of the hallock. The increased cost can be justified only if material savings can be effected by the use of treated hallocks. When untreated hallocks are employed, it is customary to replace such hallocks completely at the end of each season and under adverse weather conditions even within the season. Limited experience in the use of waxed hallocks indicates that the wax treatment will increase the useeful life of the hallocks to not less than three years. The berry industry in the Pacific Northwest requires the use of about 30,000,000 hallocks and therefore a yearly expenditure of $450,000 for replacement of untreated hallocks or $1,350,000 over a three year period. If the same number of hallocks were wax treated, the cost based on a three-year useful life would be $789,000, leaving a net savings of $561,000, or $187,000 per year.

While no quantitative figures have been obtained on the exact magnitude of fruit losses due to mold growth from infected hallocks, the industry is constantly reminded of this fact. Direct evidence consists of the large number of berries removed at the inspection lines and the confiscation of processed products because of high mold counts. The use of waxed hallocks would greatly reduce such losses and the resultant savings would far outweigh those due to reduced hallock costs.

Future investigations. The treatment of berry hallocks by means of wax is one solution to the problem of mold growth control in the berry processing industry. There are numerous other possibilities and variations including the use of resins, plastics, varnishes, and even other materials of construction. The Western Regional Research Laboratory is at present investigating the feasibility of a double dip process, whereby it may become possible to treat the wet hallocks directly after forming, thereby eliminating the drying stage and the associated handling costs.

A Laboratory-Scale Continuous Vacuum Flash Evaporator

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A laboratory-size continuous vacuum flash evaporator for the removal of volatile flavor constituents from fruit purees and juices is described. The apparatus is also useful for the thermal inactivation of enzymes, for making juice and puree concentrates, and for deaerating liquids. The efficiency of removing the volatile organic substances has been estimated by evaporating model systems of water containing 0.005% ethanol, and water containing 0.005% phenol, and by distillation experiments with strawberry purees. To recover about 85% of the volatile organic materials in each case, it is necessary to evaporate approximately 45% of the water from the alcohol solution and from the strawberry puree.

During a chemical investigation of volatile flavor substances in fruits, a need arose for an efficient laboratory apparatus for separation of these substances. For this purpose a continuous vacuum flash evaporator was built; it embodies features which were believed to be necessary and which were not found collectively, either in any equipment described in the literature, or made commercially.

The design of this evaporator permits the simultaneous inactivation of enzymes, deaeration of the product, and the production of a water solution of the volatile flavor and a concentrated puree or juice. The water containing the volatile flavors is removed from purees or juices at about 95° F. (35° C.) in a continuous, single-pass operation—evaporating from 5 to 50% from thick purees and 5 to 80% from thin purees or juices. Quantities of material as small as one kg. or as large as 100 kg. (approximately one day's run can be processed conveniently.

The behavior of the evaporator was tested by measuring the relationship between the percentage of water evaporated and the recovery of certain volatile organic materials from very dilute solutions, and by actual measurement (by carbon analysis) of the recovery of organic volatile material from a strawberry puree.

Apparatus. The apparatus (Figure 1) is so made that all parts which come in contact with the food products, with the exception of some connections, are made of stainless steel (s.s.) and glass. It consists essentially of a variable speed drive (1) coupled to a stainless-steel metering pump (2) having a capacity of 0 to 1 liter per minute; a 9-foot, steam-jacketed, ¼-inch stainless-steel tube (5), which serves as the pre-heater and for inactivation of enzymes, a steam-heated evaporating tube (18); a cyclone vapor-liquid separator (22); a spiral tube surface condenser (30); an after cooler (33); a liquid receiver (27); a residue receiver (27); and three dry-ice or liquid air traps (38). The trap which just precedes the vacuum pump is necessary to prevent the oil vapors from the pump from diffusing into the other traps, which condense the volatile flavor materials. Ice water, circulated with a ¼ h.p. pump, is used for condensing and cooling the distillates in heat exchanger (30) and (33), and for cooling the stripped concentrates in exchanger (24). Vacuum is provided for the evaporator by a mechanical pump.

A restricting tube (15) was found desirable in order to prevent the vacuum in the evaporator from reducing the pressure in the pre-heater tube (10) and thereby lowering the temperature. A temperature of 90° C. or above is desirable for two reasons: (a) to effect inactivation of enzymes, and (b) to

[a] Bureau of Agricultural and Industrial Chemistry, Agricultural Research Administration, U. S. Department of Agriculture. Report of a study made under the Research and Marketing Act of 1946.

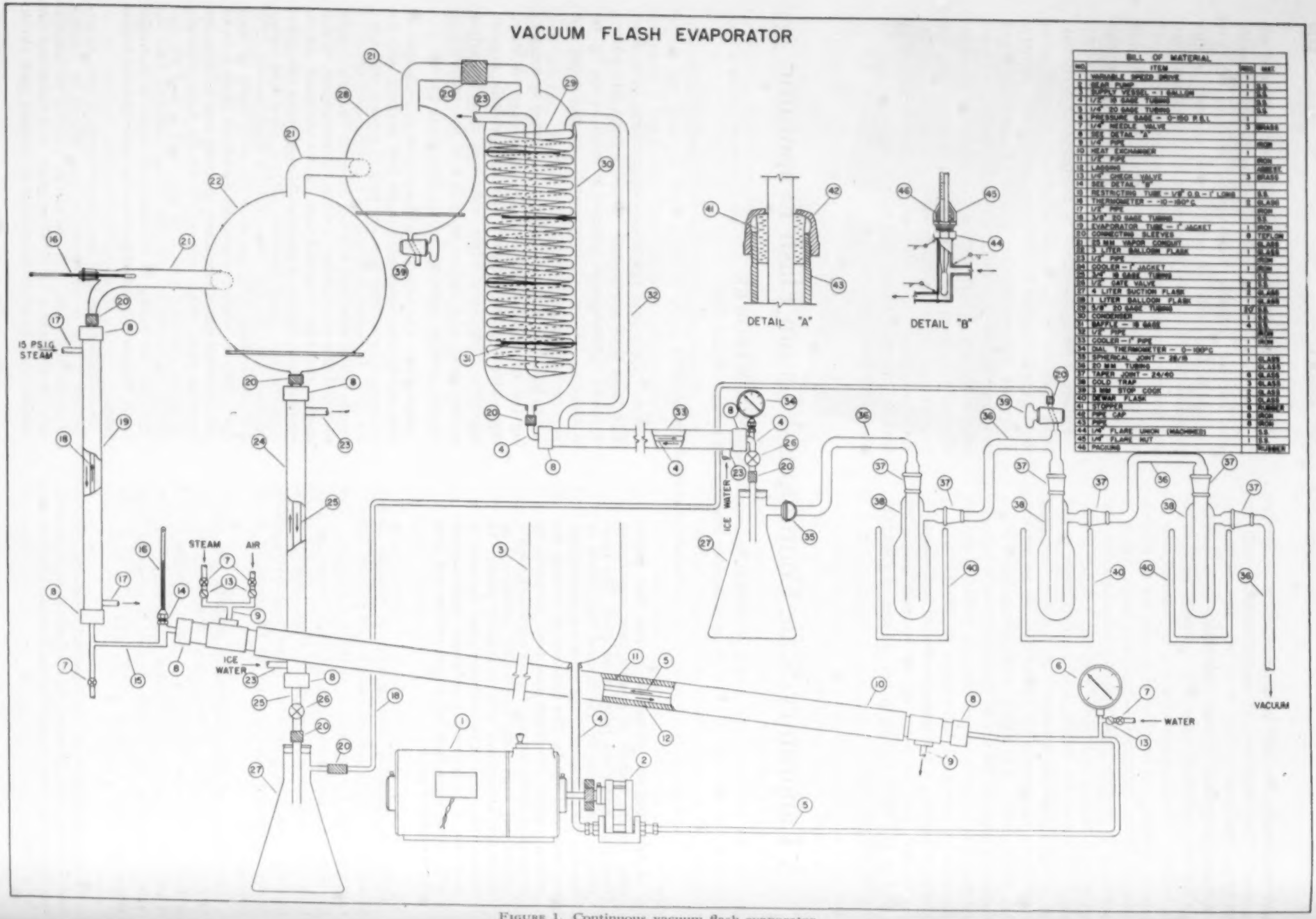

FIGURE 1. Continuous vacuum flash evaporator.

insure that the juice or puree is in a super-heated condition when it enters the evaporating tube (maintained at a reduced pressure) which results in rapid boiling and high-velocity movement of the material through the evaporator tube. This condition increases heat transfer and decreases the tendency of the fruit to "burn" on the wall of the tube. It has since been found that a 5-foot section of ⅛-inch 20-gauge steam-jacketed tubing can effectively replace the 9-foot section of ¼-inch tubing. Although more pumping pressure is required, the need for the restricting tube is eliminated and, more important, the heating time in the pre-heater is decreased. This reduces the possibility of heat damage to the fruit and also results in less fouling of the pre-heater. For example, for a strawberry puree fed at a rate of 420 ml. per minute, the pressure and heating time would be changed, respectively, from about 10 pounds and 7 seconds to 50 pounds and 0.5 second.

Procedure for Flash Evaporation. An example of the procedure used in the removal of the volatile flavors from puree or juice is given below. The material to be processed is placed in a tank (3), and the air in the system is exhausted with a mechanical pump until a pressure of about 5 mm. of mercury is reached. Pressure was read on a dial gauge located between vacuum source and dry ice traps. For operating at this pressure ice water from a 40-gallon drum is circulated through the condensers. The variable speed drive (1) is adjusted to operate the metering pump (2) at the desired processing rate[b] (feed rates to the evaporator of about 100 to 450 ml./min. have been used). Steam is introduced in the jacket of the pre-heater (10) at about atmospheric pressure, and into the jacket of the evaporator tube (19) at 10 to 15 pounds p.s.i.g. Under these conditions the temperature of the vapor emerging from the evaporating tube as read on thermometer (16), varied from about 35° to 40° C., corresponding to 42 to 55 mm. pressure.

As the receivers (27) for the distillate and for the stripped residue become filled, they are replaced by empty receivers without shutting off the evaporator or losing vacuum. This is done by closing the two valves (26), thus isolating the evaporator from the receivers. The vacuum in the receiver is then released and the sleeve (20) is slid up, exposing a butt joint connection which is disengaged, and a new flask is placed in position. The air is exhausted from the flask, valves (26) are turned back on, and the evaporation is continued. At the end of the run about 200 ml. of water is usually pumped into the system to displace the residual puree or juice.

An inlet (13) from the water main is provided for cleaning and flushing the apparatus after a run. The cleaning operation is efficiently accomplished by pumping about 300 ml. of trisodium phosphate solution into the heated pre-heater tube and the heated evaporating tube. After about 5 minutes the hot solution is rinsed into the vapor-liquid separator bowl (22), valves (26) and (39) being closed, and the bowl is filled and rinsed with fresh water.

FIGURE 1. Continuous vacuum flash evaporator.

PERFORMANCE OF THE EVAPORATOR

With this equipment one of the factors which determines amount of evaporation is the feed rate. Table 1 shows the relationship between the feed rate and the amount of water which is removed by evaporation from the feed material.

From the experiments with water it is seen that the percentage of water evaporated decreases with increase in feed rate, though not in a linear fashion. A 10-fold increase in feed rate from 100 to 1000 ml./min. resulted in a 5-fold decrease in evaporation from 74 to 15% at a given feed rate. The percent of evaporation differs with different materials because of variable heat transfer coefficients and solids content.

TABLE 1

Feed rate and percent water evaporated by continuous vacuum flash evaporator

Material processed	Feed rate	Water evaporated [a]
	ml./min.	%
Water	100	75
Water	200	37.5
Water	400	21.0
Water	1000	15.0
Tomato juice	160	55.0
Tomato juice	425	25.1
Strawberry puree	125	38.0

[a] Based on weight of feed material.

When the flash evaporator is employed for the removal of volatile flavor components from fruit, the completeness of removal is a function of the distillation characteristics of the various components and the amount of water evaporated. Since it is known that the flavor of fruit is a complex mixture of organic materials, the degree of removal varies with the different components. The removal of all of these materials from water by an approximately single-plate distillation such as occurs in a flash evaporator is of course impossible. Even such low-boiling materials as ethyl alcohol will only approach 100% removal at a point where most of the water is also distilled off. Other materials with boiling points closer to that of water will be correspondingly more difficult to remove. Some compounds with boiling points considerably above 100° C. may be removed as minimum boiling binary azeotropes with water. High-boiling substances, insoluble in water, are removed by steam distillation.

In order to obtain some indication as to what might be expected in the recovery of volatile organic materials by flash vaporization, the distillation and recovery of known compounds was carried out on two model systems, which were 0.005% ethanol solution and 0.005% phenol solution. These compounds were chosen because they differ greatly in their ease of removal from water by distillation. The chosen concentrations correspond approximately to the concentration of the volatile organic flavors in fruits. For these low concentrations there are no reliable vapor pressure data in the literature that would enable one to calculate the expected recovery.

The recovery of ethanol in the distillate for various amounts of liquid distilled is shown in Table 2. The results represent the alcohol collected in both receiver and dry-ice traps. The amount of alcohol in the traps varied from 2 to 4% of the total distilled. As shown, the evaporation of 10% of the feed will remove approximately 55% of the alcohol.

The percentage recovery of phenol which forms an azeotrope with water boiling at 99.6° C. at atmospheric pressure was found to exactly equal the percentage of the feed which was evaporated, that is, 10% of phenol was recovered when 10% of the feed was evaporated. Corresponding recoveries were found in experiments with more dilute solutions, down to 0.001% phenol. These results indicate that poor yields for this type of

[b] At a processing rate of one-half pound of material per minute the residence time of the juice or puree in the evaporator is about 15 seconds. At this speed two operators, with the aid of a motor-driven screw-feed pulper, can reduce whole fruit to a puree and process it in a matter of five minutes or less, thus minimizing deteriorative changes which might otherwise occur in unstable purees.

TABLE 2

Ethyl alcohol removed from a 0.005% ethanol solution by flash evaporation at about 5 mm. of Hg [a]

Distilled	Ethanol recovered [b]
%	%
5.5	27
10.0	55
21.0	68
37.5	79
75.0	about 99

[a] Pressure measured between the vacuum source and the dry-ice traps.
[b] Alcohol determined by oxidation with alkaline permanganate as described by Friedmann and Klass *(6)*.

compound may be expected when small percentages of the feed are evaporated.

Phenol was quantitatively estimated by a modification of the method of Folin and Ciocalteu *(5)*, which consists of diluting a known volume of the phenol solution to 5 ml. in a 25 x 120 mm. test tube. To this is added 2.5 ml. of saturated sodium carbonate solution and 1.5 ml. of Folin-Ciocalteu reagent, and the contents are heated at 35° C. for 1 hour. After cooling, the intensity of blue color which is formed is read on a Klett-Summerson colorimeter with a 420 mμ filter, and the amount of phenol is calculated from a standard curve.

A second method for testing the efficiency of the apparatus consisted of stripping puree samples obtained from several varieties of strawberries. The evaporation was conducted in such a manner that approximately 40% of water based on the weight of the puree was distilled. The stripped residue so obtained was diluted with distilled water to the original volume and was again stripped. Each distillate was then concentrated on a Stedman fractionating column to about 30-fold. A 30-fold concentration means that the weight of the final distillate is 1/30 that of the original puree. It should not be taken to mean that the concentration of volatile organic material in the final concentrate is 30 times that present in the original puree.

These concentrates were then analyzed for carbon, using the wet combustion procedure described by Christensen and Wong *(3)*, which involves a hot sulfuric acid-dichromate oxidation, absorption of the liberated carbon dioxide in standard barium hydroxide solution, and titration of the excess barium hydroxide. The data in Table 3 give the percentages of water removed and the mg. of carbon per kg. of puree for both strippings. The percentage of carbon, based on the total carbon recovered, is also given for the second stripping.

As may be seen, the amount of essence which is represented by carbon found in the second stripping is, in general, about 12 to 13% of the total. Data obtained from other fruits, including raspberries, cherries, and other strawberries, were in approximate agreement with these values. The distillate from a third stripping in the case of the Marshall strawberry (Expt. Station) contained about 1.9 mg. of carbon per kg. of puree, which is about 1% of the total carbon found. This suggests that nearly complete removal of the volatile organic substances, which may be recovered by this method, has been attained in the first two strippings and that over 80% of the total was recovered in the first

TABLE 3

Flavor stripping efficiency on different varieties of strawberries [c]

Strawberry variety	First stripping		Second stripping		Carbon in second stripping [c]
	Water removed [b]	Mg. carbon per kg. puree	Water removed [b]	Mg. carbon per kg. puree	
	%		%		%
Marshall (Expt. Sta.)	48.0	150.0	50.0	12.5	7.7
Marshall (Linden)	43.0	39.6	54.0	6.3	13.7
Sovereign	42.0	48.0	42.0	7.4	13.4
Ettersburg	35.2	89.3	44.0	14.0	13.5
Corvallis	42.0	53.0	41.0	6.9	11.5
Britemore	39.0	28.0	38.0	3.8	12.0

[c] Flash vaporization was conducted at a feed rate of about 150 ml. per minute and at a pressure of about 5 mm. of mercury.
[c] Values are based on the total recovered carbon in both strippings.
[b] Water removed is expressed as the percent of the weight of the puree.

stripping where approximately 40% of the weight of puree was evaporated.

It must be understood that these carbon values represent only an approximate measure of the amount of organic material recovered from the strawberry and do not represent necessarily the quality of the flavor so recovered.

OTHER APPLICATIONS OF THE EQUIPMENT

Although this equipment was built to be used primarily as a continuous vacuum flash evaporator for the recovery of the volatile flavors, it has been found to have other uses. Fruit concentrates can be made very effectively. A raspberry juice was concentrated to a six-fold sirup without any trouble. Purees or juices are easily deaerated at room temperature by flashing off approximately 3% of the water, and if desired, the flavors which are removed in the process can be trapped and returned to the deaerated product.

By using the pump and the pre-heater and inserting insulated holding tubes and a cooling coil, thermal inactivation of enzymes can be made under precise time-temperature conditions. Such a study has been made on 5 different fruits and has been described in a separate communication *(4)*.

Application of the principle of pre-heating (by steam injection) followed by tubular evaporation has been studied at this Laboratory on pilot-plant scale *(1, 2)*.

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The Use of Cooling Curves as a Method of Determining the Temper of Molten Chocolate[a]

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An experimental procedure has been developed by which the degree of temper of molten chocolate may be ascertained. This test method involves measuring the rate of cooling of a chocolate sample which is being cooled in an atmosphere of air at —70° C. Such a cooling curve changes in shape and slope with the degree of temper of the chocolate sample. This method was used with cocoa butter as well as with the finished chocolate. The parallel results obtained indicate that the effect being measured is only that of fat crystallization.

The tempering of chocolate may be defined as the promotion of a sufficient quantity of seed crystals of the proper type within the molten mass to insure a stable product on solidification. This definition precludes that any device for measuring the degree of temper in the molten state should determine the amount of crystallization which has already taken place. It is known that in the cooling curve method for the determination of the solidification point of fats, a large degree of supercooling is obtained before the rise in temperature caused by the latent heat of crystallization occurs. If, however, some crystals are already present (as in tempered cocoa butter) the degree of supercooling is appreciably altered. Furthermore, this alteration would show a definite trend as the percentage of initial crystals is increased. Comparison of a point in this trend with a well-tempered and thus stable fat or chocolate should then give us the sought after temper criteria. Thus, a cooling curve or solidification curve of the molten chocolate suggests itself as a simple and convenient device for studying the degree of crystallization in the crystal-liquid system.

Early comparisons of curves of tempered and untempered chocolate proved of little value but they led to a detailed study of the relation between sample size and cooling temperature in order that a marked change in cooling rate could be obtained with tempered material. The desired effect was approached as the coolant temperature was lowered and at —70° C., using a sample of approximately 50 g., the balance of heat withdrawal and heat of crystallization proved to be such that tempered fat showed a different type of cooling curve from the curves of untempered fat. This cooling temperature was obtained with a dry-ice acetone mixture. This temperature also produced a more rapid test as is seen in Figure 1. Curve B shows no dip because completely liquid cocoa butter solidifies into a glassy state without crystallization when cooled at this rate.

EXPERIMENTAL PROCEDURE

The sample (40 to 50 g.) of the liquid fat being tempered is poured into a glass tube, 1½ inch in diameter and 4 inches in height, fitted with a two-hole stopper containing a stirrer and 0.2° C. thermometer. This glass tube is fitted into the insulated neck of a one pint jar 2¾ inches in diameter which acts as an air jacket between the sample and the coolant which surrounds the larger vessel, as shown in Figure 2. Enough dry ice is used with sufficient acetone to insure good thermal contact between the dry ice and the glass and to produce a temperature of —65° to —75° C. in the air jacket. One minute is taken between the pouring of the sample and its immersion in the air jacket to allow the thermometer reading to rise to the temperature of the sample. After immersion, a temperature reading is made as soon as a drop is noticed. This is followed by alternate 15 second temperature readings and stirring with 3 strokes. The mass is only stirred during the first 2 minutes or until the sample freezes. Further motion after this will only introduce air gaps around the thermometer. The 30-second temperature readings are carried on for approximately 10 minutes.

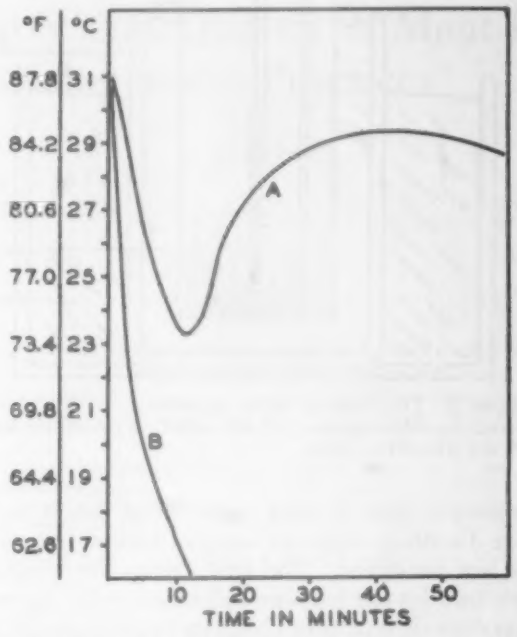

FIGURE 1. The effect of different coolants on the cooling curves of standard cocoa butter. A is the curve in standard ice-water coolant; B represents the curve in dry ice-acetone coolant.

DISCUSSION

The cooling rate has three general phases. The initial drop is rapid but followed by a reduced rate which may even show a temperature rise with very untempered chocolate. Finally the rapid rate is resumed. As proper temper is approached the middle or slow phase occurs at a higher temperature and to a lesser degree.

A laboratory test was set up in which chocolate[b] was held at 31° C. at which temperature it gains temper

[a] This work was supported by the Research Committee of the Pennsylvania Manufacturing Confectioners Association.

[b] A dark sweet coating modified with 0.6% Span 60 and 0.4% Tween 60.

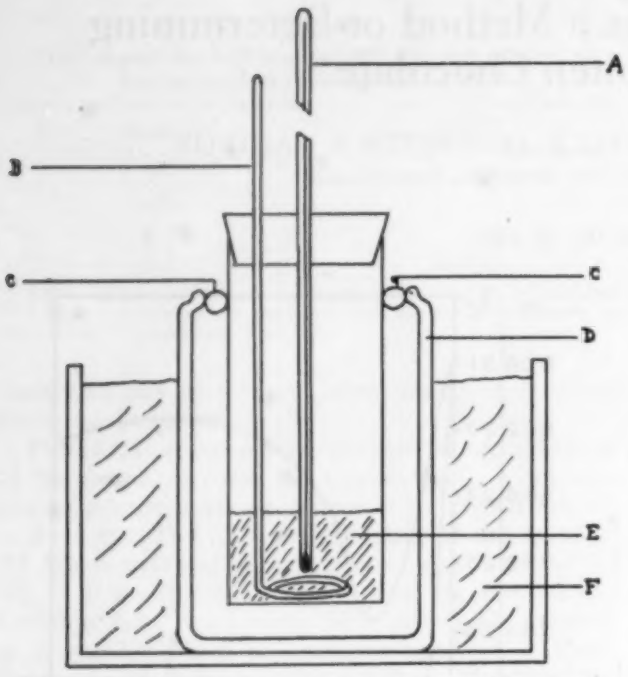

FIGURE 2. The cooling curve apparatus. A, thermometer; B, stirrer; C, rubber gasket; D, air jacket; E, chocolate sample; and F, dry ice-acetone bath.

more slowly than is usual under plant conditions. In Figure 3 cooling curves of samples removed at various times are presented. The first curve, representing a sample held for one and one-half hours at the tempering temperature, is typical of chocolate in poor temper. The initial rapid temperature drop is due to supercooling, an effect made possible when only a few seed crystals are present. The leveling of the curve indicates the period of crystallization when the temperature change is arrested because of the removal of heat of crystallization rather than sensible heat. When the rate of crystallization decreases, the heat withdrawal again shifts to favor the sensible heat and the temperature drops as before.

In the case of a sample tempered for 3 hours, the supercooling rate was not as great and the level of maximum crystallization occurred at a higher temperature due to the greater number of seed crystals present at the initiation of cooling. The curve of the sample tempered for 6.5 hours is similar to the curve mentioned above, but the sample's higher ratio of crystal to liquid before testing caused its level of crystallization to occur at a still higher temperature.

The sample held for 7.5 hours at 31° C. showed an almost constant rate of cooling which gave a curve approaching a straight line with a slope only slightly different than the average slope of the last curve; but unlike the latter, no level portion appeared. These characteristics are typical of a curve representing a sample of well-tempered chocolate. This was proven by stability tests conducted on bars which were cast at the time of withdrawal of cooling curve samples.

The final curve represents chocolate which we describe as over-tempered. This is a result of carrying the tempering process too far. In this condition it is too viscous for most work and is likely to freeze.

The same progression of curves can be obtained with pure cocoa butter. Figure 4 illustrates the development of temper in cocoa butter. The curve of a sample after 1 hour of tempering shows little change from the curve of completely molten butter (indicated by unconnected circles). After 3.5 hours of tempering enough crystals had been formed to cause some further crystallization during the test and the curve indicated this by a gradual

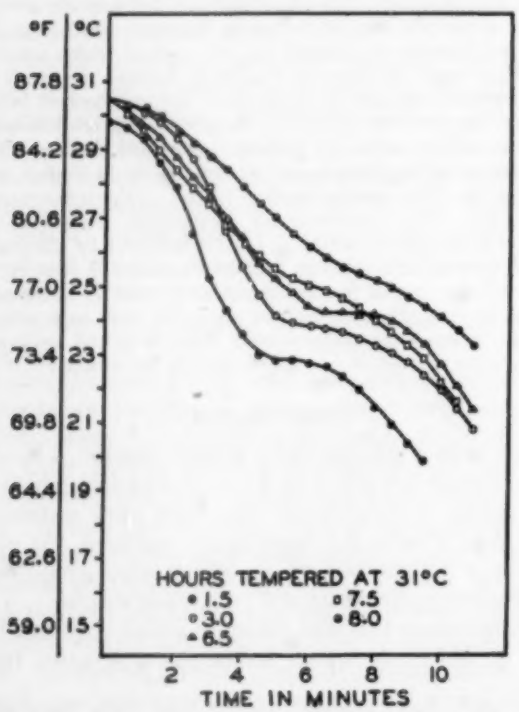

FIGURE 3. Cooling of chocolate tempered at 31° C.

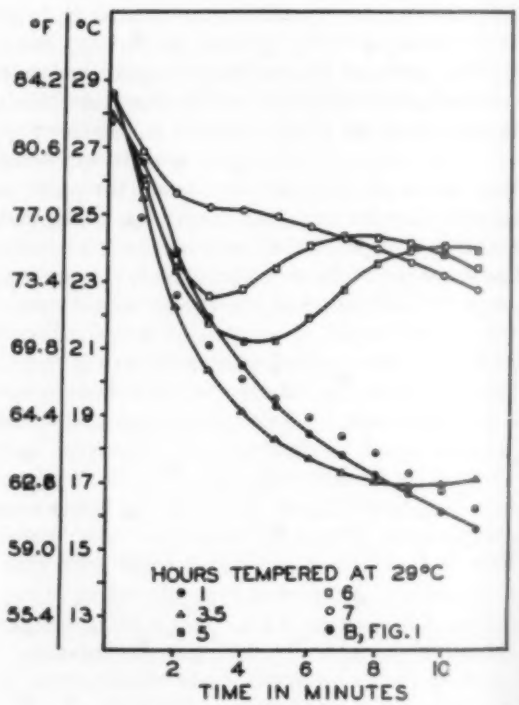

FIGURE 4. Cooling curves of cocoa butter tempered at 29° C.

rise. As the ratio of crystals to molten material in the tempered mass increases, this cooling curve rise decreases in magnitude. Finally, the rise gives way to a slow but steady decreasing temperature as is seen in the curve of 7 hours of tempering. Once again this is the point of good temper.

CONCLUSION

This investigation has culminated in a scientific method for determining the temper of chocolate which can be used as a simple, convenient, foolproof procedure for plant control in the chocolate and confectionery industry.

Studies on Meat. III. The Biochemistry and Quality of Meat in Relation to Certain Feeding Management Practices[a]

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The results of investigations conducted with two groups of steers are reported. The carcasses of the two groups were examined in an effort to integrate carcass grade, quality, yield of edible meat, and tenderness of meat with fundamental studies on the biochemistry, nutrition, and physiology of beef animals.

This is the third report in a series of investigations *(3, 4)* in which an effort is being made to integrate quality factors of meat such as tenderness, marbling, market grade, yield of edible meat, trimmable (waste) fat, etc., with fundamental studies on the biochemistry, nutrition, and physiology of beef animals. In a recent experiment investigating the relative values of various protein supplements for steers on ground corn and cob meal and poor quality hay ration, the carcasses from two lots of steers (Group I) differing greatly in rate of gain were studied. In addition, five small, five medium, and five large Hereford steers (Group II) were made available for similar study. These steers were from another project in which the feeding performance of these three sizes of steers was studied and they were of the same age when put on test as calves and were wintered, pastured, wintered again, and pastured through September, 1950. A summary of the data obtained from these two groups of cattle has revealed a number of important considerations for further study.

TEST ANIMALS AND EXPERIMENTAL METHODS

Detailed information on the feeding management of these two groups of cattle will be published at a later date. The first group (Group I, made up of Lots 1 and 5) of Hereford steers was two lots of ten each taken at the close of a study on the relative efficiency of protein supplements. The basic ration was full fed and consisted of corn and cob meal, poor quality hay, mineral mixture, salt and cod liver oil equivalent to 4,500 γ of vitamin A per steer per day. Ten steers known as Lot 1 were fed, in addition to the basic ration, one and one-half pounds of solvent-extracted soya bean oil meal (44% protein) per day. Another ten steers known as Lot 5 were fed three and one-half pounds of dehydrated alfalfa leaf meal (19% protein) per day. A summary of the feed consumption data is given in Table 1.

The second group (Group II) of cattle was from a Hereford Association project and was put on test as calves in December, 1948. They were roughed through two winters on hay, ensilage, and soybean oil meal in such a way that the weight gains were restricted to one pound per day. During the summers of 1949 and 1950, they were pastured and finally slaughtered in late September, 1950.

TABLE 1

Feed consumption and weight gains for cattle on soya bean meal and alfalfa leaf meal supplements

	Lot 1	Lot 5
	lbs.	*lbs.*
Average starting weight	625	630
Average final weight	1005	1109
Average weight gain in 210 days	380	479
Average weight gain per day	1.81	2.28
Average daily ration		
Corn and cob meal	13.6	15.4
Supplement	1.5	3.5
Poor quality hay	2.3	2.3
Minerals, free choice	0.150	0.143
Salt, free choice	0.05	0.04

All cattle were slaughtered in weekly groups of five or six. One side from each carcass, excluding the loin, was boned out into trimmable fat, edible portion, and bone. The shortloin from each of these sides was used for laboratory tests and tenderness determinations. This procedure, of course, is somewhat irregular for a study of this sort but has been found to give useful information on the relative amounts of bone, trimmable fat, and edible lean meat for these cuts.

Tenderness, alkali insoluble protein, intramuscular fat, muscle hemoglobin, moisture, and pH were determined at three days post mortem as described in the previous papers of this series. The anterior portion of the loin was used for these determinations. When determinations were repeated at fifteen days post mortem, the posterior end of the loin was used. The only exceptions to this procedure were the medium size Herefords No. 81, 82, 83, 84, and 85, where the order of sampling was reversed.

Fat color was determined from a sample of kidney fat. Approximately 0.5 lb. of the fat tissue from the kidney knob was ground through a 5/32 inch plate. The ground tissue was melted on a steam bath and the melted fat decanted and filtered using a filter aid. The color absorption of several fat samples over the visual spectrum indicated that most of the color was from carotenoid pigments. To standardize the measurement of the fat color, the optical density at 430 mμ was determined using a Coleman Model *10S* spectrophotometer on a 3 to 1 mixture by volume of melted fat and redistilled carbon tetrachloride. The optical density multiplied by 6⅔ is approximately equal to the micrograms of pigment per ml. of fat expressed as β-carotene.

The vitamin A content of the liver was determined by the Carr-Price method as described by the Association of Vitamin Chemists *(7)*. The values of vitamin A given have been cor-

[a] Published with the approval of the Director of the Ohio Agricultural Experiment Station. Journal Article No. J-46-50.

rected for carotene, and it should be pointed out that in both Lot 1 and Lot 5 only insignificant amounts of carotene were found in the livers.

Juiciness was determined from judgments of the taste panel at the same time as tenderness was being evaluated. A scale of 1 to 5 was used. Where the adjectives were attached, the scores were: very juicy, 5; juicy, 4; moderately juicy, 3; slightly dry, 2; and dry, 1. Although no detailed analysis of juiciness data is given here, in these particular experiments juiciness data did not compare favorably in reliability and reproducibility with tenderness determinations.

The area of fat and lean at the rib eye was determined from tracings made when the sides were ribbed. On the tracing, a tangent was drawn from the outside edge of the rib eye perpendicular to the surface of the fat covering. The area of the fat within this tangent and the area of the rib eye were then determined using a planimeter.

The percentage yields of edible portion, trimmable fat, and bone were determined by actually boning out the remainder of the side after the loin was removed for tenderness and biochemical studies. Trimming was done in such a way as to have no fat covering beyond one-fourth inch on the edible portion.

Chilled carcass weights were calculated as the hot carcass weight minus 2½%. This value for the chilled carcass was used to compute dressing percentage.

The carcasses were graded into the usual grades and numerical grades assigned as follows: Top Choice, 15; Choice, 14; Low Choice, 13; High Good, 12; Good, 11; Low Good, 10; High Commercial, 9; Commercial, 8, and Low Commercial, 7.

RESULTS AND DISCUSSION

The results on the steers (Group I) from the study comparing alfalfa leaf meal and solvent-extracted soya bean oil meal as protein supplement are shown in Tables 2 and 3 and the data from the three types of Hereford steers (Group II) appear in Tables 4 and 5. Much of these data are difficult to interpret since the number of test animals in any single variation in management is rather limited. However, some trends are noted and a number of interesting observations result from a study of these results.

The variation in rate of gain in weight of Group I animals is apparent between lots and within the lots. The steers on alfalfa leaf meal as a group gained more weight than those on the soya bean meal for a 210-day feeding test, 2.28 as compared to 1.81 lbs. per day. The individual extremes were 2.90 and 1.54 for animals No. 54 and 68, respectively. A rather complete study of the carcasses from these steers was made and no close relation appeared between rate of gain and carcass quality, tenderness, biochemistry, and yields of edible meat.

The two lots are readily compared from the averages shown in Tables 2 and 3 and although Lot 5 carcasses averaged 85 lbs. heavier than Lot 1, most characteristics show only insignificant differences. It is worth noting that the yields of edible portion, bone, and trimmable fat were about the same for both lots indicating that the increased gains of Lot 5 actually represented no significant decrease in the yield of edible meat nor a significant increase in wasted fat trimmings *(6)*. The slight advantage in dressing percentage for Lot 5 may or may not be of significance. These results tend to dispel the idea that fast growth necessarily means a much greater proportion of waste fat.

Although the areas of fat and lean at the rib eye showed greater values for Lot 5, the relative amounts of fat to lean were about the same in Lots 1 and 5. Furthermore, there seemed to be no marked correlation between these values and the yield of edible portion or trimmable fat. From the report of Hankins and Burk

TABLE 2

Tenderness, juiciness, and biochemical characteristics of the carcasses from steers on soya bean meal and alfalfa leaf meal supplements

Carcass no.	Tenderness		Alkali-insoluble protein		Juiciness		Intramuscular fat	Muscle hemoglobin, optical density at 542 mμ	Fat color, optical density at 430 mμ	Liver vit. A, μg/100 g.	Moisture	pH
	3 day	15 day	3 day	15 day	3 day	15 day						
Lot 1. Solvent extracted soya bean oil meal												
			%	%			%				%	
51	5.58	8.00	0.429	0.323	.....	4.67	5.16	0.649	0.171	561	71.0	5.54
53	5.42	7.67	0.430	0.379	.....	4.50	5.49	0.838	0.102	703	70.3	5.62
55	5.33	5.92	0.151	0.191	.....	4.00	9.78	0.629	0.037	247	67.7	5.45
57	7.17	8.08	0.350	0.236	4.17	4.08	4.64	0.645	0.134	891	71.9	5.59
59	5.17	8.17	0.269	0.235	3.08	4.67	5.56	0.659	0.145	244	70.4	5.53
60	5.92	7.50	0.210	0.131	3.58	4.00	7.76	0.710	0.143	799	70.2	5.50
64	5.17	8.58	0.196	0.021	3.50	4.75	7.48	0.942	0.085	396	68.6	5.62
65	6.25	6.75	0.175	0.106	3.17	3.50	6.31	0.621	0.090	244	69.5	5.49
68	6.67	7.42	0.123	0.066	3.58	4.42	4.96	0.625	0.183	241	69.9	5.52
70	.....	.....	0.094	0.055	.....	.....	6.96	0.818	0.151	237	69.0	5.50
Mean	5.85	7.56	0.243	0.173	3.51	4.29	6.41	0.715	0.130	456	69.9	
St. error of mean	0.24	0.27	0.039	0.038	0.16	0.14	0.50	0.036	0.012	82		
Lot 5. Dehydrated alfalfa leaf meal												
52	6.00	6.83	0.282	0.174	.....	3.75	6.92	0.655	0.169	703	68.3	5.39
54	6.08	7.83	0.191	0.249	.....	4.67	8.58	0.550	0.154	396	68.8	5.54
56	5.92	7.67	0.292	0.141	.....	4.42	7.62	0.645	0.144	1056	69.1	5.54
58	4.42	6.83	0.330	0.385	3.58	3.75	4.16	0.591	0.199	799	72.9	5.51
61	5.58	7.42	0.385	0.264	4.25	4.74	4.74	0.797	0.143	809	71.9	5.51
62	6.25	7.50	0.361	0.253	3.91	4.08	6.36	0.644	0.175	1387	70.6	5.42
63	6.17	6.83	0.203	0.184	3.83	3.92	4.79	0.741	0.145	1651	71.0	5.53
66	5.92	6.50	0.232	0.088	3.33	3.67	4.92	0.879	0.184	2229	71.0	5.55
67	6.58	6.92	0.248	0.145	3.92	3.67	5.22	0.771	0.175	990	71.3	5.53
69	.....	.....	0.159	0.179	.....	.....	5.48	0.659	0.186	1436	71.4	5.45
Mean	5.88	7.16	0.268	0.206	3.80	4.02	5.88	0.693	0.167	1146	70.6	
St. error of mean	0.20	0.15	0.024	0.027	0.15	0.12	0.46	0.032	0.006	170		

TABLE 3

Weight gains of steers on soya bean oil meal and alfalfa leaf meal supplements and the grades, dressing percentages and boning yields for their carcasses

Carcass No.	Grade	Gain in wt. in 210 days	Chilled carcass wt.	Dressing percentage	Edible portion	Bone	Trimmed fat	Lean at rib eye	Fat at rib eye
Lot 1. Solvent extracted soya bean oil meal									
		lbs.	*lbs.*		%	%	%	*sq. in.*	*sq. in.*
51	10	444	577	55.76	74.2	18.0	7.4	10.88	2.40
53	11	373	630	61.19	73.5	15.3	11.2	11.19	5.60
55	11	395	611	59.24	72.1	16.4	11.2	12.90	3.68
57	12	331	641	60.61	71.4	15.9	12.5	10.06	4.23
59	11	349	602	60.49	75.5	14.2	10.3	10.79	3.78
60	14	396	599	59.37	72.7	12.3	14.6	9.90	3.91
64	13	398	567	59.18	72.6	16.8	10.2	10.13	4.16
65	13	420	591	60.91	70.2	17.1	12.4	9.66	6.74
68	12	324	609	63.11	70.5	14.6	14.8	9.75	4.62
70	11	369	608	62.13	72.7	14.6	12.5	10.93	4.92
Mean	11.8	380	603.5	60.20	72.5	15.5	11.7	10.62	4.40
St. error of mean	0.4	12	7.0	0.59	0.50	0.53	0.70	0.31	0.16
Lot 5. Dehydrated alfalfa leaf meal									
52	12	579	780	62.71	72.4	15.6	12.0	13.61	3.55
54	13	608	741	60.27	71.7	16.6	11.5	12.10	4.59
56	12	566	733	61.14	71.4	14.2	14.3	12.15	4.63
58	11	512	650	59.14	71.5	17.1	11.4	11.15	4.70
61	12	435	625	59.49	75.8	15.4	8.5	10.66	3.66
62	14	452	718	62.90	73.4	13.6	12.5	12.13	5.29
63	14	461	659	61.87	73.0	16.2	10.4	9.13	5.62
66	13	364	660	61.83	71.3	15.2	13.2	11.01	3.29
67	12	414	658	61.77	70.4	15.9	13.4	10.68	5.99
69	12	396	663	63.82	70,1	17.0	12.6	10.37	4.84
Mean	12.5	479	688.7	61.49	72.1	15.7	12.0	11.30	4.62
St. error of mean	0.3	26	16	0.47	0.54	0.35	0.54	0.39	0.28

TABLE 4

Tenderness, juiciness, and characteristics of the carcasses from large, small, and medium type Hereford steers

Carcass no.	Tenderness		Alkali-insoluble protein		Juiciness		Intramuscular fat	Muscle hemoglobin, optical density at 542 mμ	Fat color, optical density at 430 mμ	Moisture	pH
	3 day	15 day	3 day	15 day	3 day	15 day					
Large type Hereford											
			%	%			%			%	
71	2.58	4.83	0.404	0.463	3.00	2.90	4.26	0.711	0.282	71.8	5.46
72	3.00	6.58	0.408	0.393	3.08	3.44	3.58	0.671	0.255	71.7	5.40
73	3.58	5.67	0.581	0.607	3.25	3.20	1.23	0.640	0.369	74.4	5.45
74	4.17	5.50	0.541	0.495	3.17	3.00	1.84	0.650	0.302	73.2	5.41
75	2.33	5.67	0.436	0.268	3.17	3.55	4.72	0.843	0.229	71.2	5.46
Ave.	3.13	5.65	0.474	0.445	3.13	3.22	3.13	0.703	0.287	72.5	.....
Small type Hereford											
76	3.33	5.58	0.442	0.545	3.67	3.71	2.08	0.727	0.416	73.3	5.43
77	6.00	6.75	0.322	0.451	3.67	4.00	3.44	0.844	0.368	72.7	5.43
78	4.58	7.67	0.462	0.464	4.08	3.57	2.54	0.664	0.328	72.6	5.40
79	4.17	6.75	0.356	0.387	3.50	3.88	2.93	0.667	0.458	72.2	5.40
80	3.58	6.67	0.518	0.664	3.67	3.50	1.49	0.590	0.469	74.3	5.38
Ave.	4.33	6.68	0.420	0.502	3.72	3.73	2.50	0.698	0.408	73.0	.....
Medium type Hereford											
81	5.83	8.33	.....	0.473	2.80	3.60	2.41	0.608	0.392	72.6	5.51
82	5.75	7.92	.....	0.606	3.73	3.10	3.38	0.513	0.253	71.9	5.43
83	6.00	7.67	.....	0.637	3.55	4.00	3.47	0.600	0.325	71.8	5.46
84	4.75	7.42	.....	0.807	3.25	3.90	1.94	0.615	0.384	72.7	5.48
85	6.33	8.08	.....	0.458	2.83	3.42	3.61	0.635	0.438	72.2	5.51
Ave.	5.73	7.88	.....	0.596	3.23	3.60	2.96	0.594	0.358	72.2	.....

(2), one might expect a positive correlation between the area of fat or the ratio of fat to lean at the rib eye and intramuscular fat (marbling). None was found, and this may be attributable to the more homogeneous group of steers studied here.

When the two lots of Group I were dressed, it was apparent that the steers on alfalfa meal had the more yellow fat. Even so, both the difference and the absolute amount of color in the fat of the entire group were so small as to be of no major importance.

Both lots of cattle were fed 4,500 γ of vitamin A as cod liver oil so as to eliminate this nutrient as a limiting factor in their growth since the carotene in the alfalfa meal is a potential source for this vitamin. It is probably true that the carotene of the alfalfa was not too important as a growth stimulant. Another lot of steers on

TABLE 5

Grade, dressing percentages and boning yields of the carcasses from large, small and medium Hereford steers

Carcass No.	Grade	Chilled carcass wt.	Dressing percentage	Edible portion	Bone	Trimmed fat	Ratio trimmed fat edible portion	Ratio edible portion bone
Large type Hereford								
		lbs.		%	%	%		
71	10	731	57.3	69.9	20.1	9.8	0.140	3.48
72	11	634	58.0	71.7	16.7	11.3	0.157	4.30
73	10	626	56.5	71.7	17.8	9.8	0.138	4.00
74	9	647	55.5	76.0	15.6	8.3	0.109	4.87
75	9	648	55.2	71.9	17.6	10.2	0.142	4.08
Ave.	9.8	657	56.5	72.1	17.6	9.9	0.137	4.13
Small type Hereford								
76	9	544	55.5	75.2	17.4	7.3	0.097	4.31
77	10	547	57.9	75.3	17.1	7.6	0.101	4.40
78	9	493	57.4	75.2	16.4	8.5	0.113	4.58
79	10	575	58.3	73.2	17.7	9.1	0.124	4.13
80	7	532	55.9	73.8	17.6	8.8	0.119	4.19
Ave.	9.0	538	57.0	74.5	17.2	8.3	0.111	4.32
Medium type Hereford								
81	9	588	56.8	75.2	15.7	9.0	0.120	4.78
82	9	564	57.4	73.9	17.6	8.3	0.112	4.20
83	11	603	58.0	74.1	18.3	7.2	0.097	4.05
84	9	609	56.8	71.4	19.4	8.9	0.125	3.68
85	10	603	58.4	74.0	17.6	8.4	0.113	4.21
Ave.	9.6	593	57.5	73.7	17.7	8.4	0.113	4.18

this same feeding study gained 2.21 pounds per day when given the Lot 1 ration as noted above plus the ash from burning the equivalent amount of alfalfa meal fed to Lot 5. Notwithstanding these facts, the liver vitamin A for the two lots indicates that the alfalfa supplement did produce a significant amount of vitamin A. Furthermore, the levels of liver vitamin A found in Lot 1 particularly indicated a very limited amount of this nutrient in the ration, since the amount of vitamin A in the liver was below the level usually found. In fact, a recent case af anasarca in a highly finished steer observed by the authors had a liver vitamin A content of 524 γ/100 g. of liver and 11γ/100 ml. of blood.

By a study of the liver vitamin A in relation to intramuscular fat (marbling) for each lot and for the entire group, a possible negative correlation was indicated between these two factors. There was not a sufficient number of steers on which to base a definite statement, but the fact that for the twenty steers in Group I a correlation coefficient of —0.39 was obtained between the intramuscular fat and liver vitamin A indicates that further study of this point is desirable. It is to be remembered that liver vitamin A is merely a reflection of diet over a period of time. Therefore, a study of the vitamin A requirements of steers and the effect of vitamin deficiency on intramuscular fat might be worthwhile in view of the reports of Madsen and Earle *(5)*.

The tenderness at three days was the same for both Lot 1 and Lot 5, however, the average tenderness at fifteen days was 7.56 and 7.16, respectively. This may be a real difference, although of small magnitude, and the reason for it is obscure.

The alkali-insoluble protein contents are reported for both groups of steers. The correlation here between this constituent and tenderness is not apparent as reported in the first paper of this series. There are two main reasons for this. First, there are differences both of qualitative and quantitative nature between groups of steers, and second, these data represent different sampling techniques which are currently also under close study. It is hoped that at a later date some of these studies in carcass sampling may be reported. In the meantime, the data obtained are included to make these studies more complete. For the same reasons, data on muscle hemoglobin are included.

During the taste testing for tenderness, the judges were also asked to score juiciness. The authors feel that at the present time insufficient data have accumulated to permit detailed scrutiny of juiciness scoring. Juiciness data are included here even though juiciness scores do not appear as reproducible nor as reliable as tenderness scores. A somewhat superficial study of juiciness data indicates trends that perhaps both tenderness and intramuscular fat influence the score *(1)*.

As one examines the data from Group I steers, wide variations in individual animals within a lot are noted. For example, growth rate or liver vitamin A show striking differences in individual steers on the same feeding management. Such variations may reflect past history to a degree, but hereditary factors may be of primary importance. It would be desirable to study the hereditary factors in such factors as rate of growth, yield of edible meat, tenderness or consumer acceptance, etc. Such a research program may be ambitious, yet it is not beyond the reach of many investigators to study the carcasses from known strains of breeding stock. To indicate what may be possible along this line, this paper includes a summary of data obtained from the large, small, and medium sizes of Hereford steers on the same feeding management program throughout their life. These steers were selected so as to represent these three strains of Hereford breeding stock. It is indeed regrettable that more of these steers weer not available for detailed study of their carcasses since some interest-

ing differences were noted among the three types. These differences may or may not be significant since only five steers of each size were studied.

Tables 4 and 5 give the results from studying the carcasses of the three sizes of Hereford steers. When these animals were dressed out, quite a noticeable difference in fat color of their carcasses was observed, with the small ones being the most yellow and the large ones the least. This observation was borne out by determining the optical density of the fat at 430 mμ.

The amount of muscle hemoglobin was about the same for the large and small types but less for the medium.

Perhaps the most perplexing and important observation concerns the tenderness of the carcasses from the three sizes of Herefords. Both at three and fifteen days post mortem, the tenderness was least for the large type and most for the medium type with the small type intermediate. Furthermore, the differences were such that steaks from the large steers were in general so tough as to be objectionable while similar steaks from the small steers were fairly satisfactory from the point of view of tenderness. The observed differences in tenderness were larger than would usually be expected by chance sampling of groups of five steers and testing them in like manner. Although it might be presumed that the tenderness was a factor controlled by heredity in these three types of cattle, further work is necessary to establish this fact.

Most of the other biochemical factors studied show relatively insignificant differences in relation to type of steer.

The boning yields shown in Table 5 indicate that the large Herefords may be somewhat more wasteful than the others, giving more fat trimmings, lower dressing percentages, and slightly lower yields of edible meat. The small and medium Herefords yielded approximately an equal amount of edible meat on the live animal basis.

SUMMARY AND CONCLUSIONS

The carcasses from two groups of steers have been studied in an effort to get information on what role feeding management or breeding may play in determining carcass grade, quality, yield of edible meat, and tenderness of the meat as indications of consumer acceptance. Although these exploratory studies may only indicate trends, since too few steers were used to permit positive statistical evaluation of some relations, some conclusions may be made and some observations may be recorded as starting points for further study.

Two lots of steers of ten each representing two feeding managements permitting different rates of gain on grain-poor quality hay rations were slaughtered and their carcasses studied with respect to various biochemical and carcass quality factors. These results have been recorded and study of the data leads to the following observations.

1. The lot of steers gaining weight more rapidly (2.28 lbs. per day) produced carcasses yielding as much as, or more, edible meat than the lot gaining weight less rapidly (1.82 lbs. per day). This observation holds also on the individual steers.

2. The carcasses from steers on dehydrated alfalfa leaf supplements gave carcasses having fat slightly more yellow than the carcasses of steers on soybean oil meal supplements. However, the differences were not great and the absolute amounts of yellow color were not objectionable from a market standpoint.

3. The amount of vitamin A in the livers of the alfalfa fed steers was greater than in the livers of the soybean-fed steers. The amounts of vitamin A indicated that not a great excess of this vitamin was provided in the basal ration. The liver vitamin A tended to show an inverse relation to the intramuscular fat (marbling) of the longissimus dorsi (loin) muscle. The correlation coefficient of —0.39 is approximately the 10% level of significance with eighteen degrees of freedom.

4. The faster-gaining group of steers gave slightly less tender carcasses but not sufficiently so to detract from their value markedly.

From a similar study of five large, small, and medium-size Hereford steers of the same age which had been roughed through two winters and pastured two summers, the following carcass differences are noted.

1. The small steers had quite yellow fat compared with the large steers. The medium size were intermediate. The intensity of the yellowishness in the small type was objectionable from a carcass-grade standpoint.

2. The large type carcasses appeared slightly more wasteful than the medium and small carcasses.

3. The meat from the large type was perhaps objectionally tough. It was less tender than meat from the small type. The medium carcasses were the most tender of the three types. This was true both at three days and fifteen days post mortem.

Acknowledgments

The authors appreciate the help of V. R. Cahill and are glad to acknowledge the assistance of Ushakant R. Gore for the vitamin A determinations and Charles A. Hoover for the fat color determinations. The tenderness determinations were made possible by the excellent co-operation of Professor Inez Prudent and Miss Mary Fuqua of the Department of Home Economics, and Professors J. B. Brown, L. H. Burgwald, T. V. Armstrong.

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Development of Self-Inspection for Sanitation in Food Plants of New York City

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The mandatory self-inspection of food plants in New York City has many advantages, including a better liaison between health authorities and the food manufacturer and a better mutual understanding of common problems.

During 1950, in the City of New York some 78,000 violations were placed on about 14,000 wholesale and manufacturing food plants by the New York City Health Department. What the total cost of removing these violations is to the entire industry is difficult to estimate, but some extent of the vastness of the expenditures can be gleaned by reviewing a few individual situations.

A milk plant operator had to spend $50,000 to replace a leaking defective vat pasteurizing system with a new pasteurizer and accessory equipment.

A candy manufacturer had to build and equip a new building at a cost of $150,000 to eliminate an insanitary hand-dipping operation in a cellar.

Another plant spent $6000 to provide sinks, chutes, hand trucks, covers, hoods, etc. which were of sanitary design and construction, as required by the Sanitary Code. Water supply lines had to be replaced, floors regraded and walls waterproofed in the same building.

A coffee roaster had to install equipment to eliminate a smoke, odor and chaff violation at a cost of $15,000.

An ice cream manufacturer built a manufacturing room with rough, instead of smooth brick walls and with a toilet compartment in an unsatisfactory location. He spent $75,000 to install tile walls and to place the toilet elsewhere so as to provide more space for cleaning.

It cost a fish dehydrating plant $30,000 to install barometric controls, odor condensers, new piping and cookers to eliminate an odor nuisance.

In addition to these special expenditures for removing violations found by inspectors, there are the regular budgetary appropriations which each plant must make available for routine day-to-day sanitation chores. This includes the cost of cleaning tools, chemicals, soaps, detergents, disinfectants, and a substantial list of specialist services such as plumbing, carpentry, extermination, etc.

Does the money spent for removing violations and for the regular day-to-day plant clean-up program bring the sanitation returns it seeks to purchase? The answer is "no" in too many instances. Such financial misadventure is a matter of primary concern to the plant operator himself, but it is also a matter of direct importance to the Health Department.

It is fairly well recognized that when a food plant operates at a loss for any reason, sanitation expenditures are generally early victims of the budgetary axe. It is also recognized that when sanitation measures are too costly or too difficult to carry out, the objectives sought by the health laws are not attainable. When the plant sanitation program is allowed to lapse for any reason, there results further deterioration of the plant and operations, with marked effect on the quality of the product, causing lowered sales volume and the beginning of a cycle in which plant conditions and product quality get worse and worse, until the situation is hopeless.

In these circumstances, the usual course of action by the Health Department is embargo of the product, prosecution in the courts, and finally sealing up of the plant and revocation of permit. This results in bad newspaper publicity and loss of prestige which competitors sometimes utilize in seeking sales advantages. Other agencies may act and court injunction may be issued restraining the operator from shipping foods in interstate commerce. It is the plant operator who suffers most from official reaction to his situation. But because of the importance of successful industry operation to the welfare of the individual and the community, this problem is at the same time of serious concern to the health administrator.

A second reason for the importance of the problem to the Health Department is that the measure of success of the health officer of today is not the number of summonses his staff serves, but rather the prevention of violations. The mark of efficiency of the inspector and administrator is their effectiveness in improving the sanitary operation of plants and safety of the product with a minimum of police methods.

This is not an accidental change of viewpoint. Careful study and scientific appraisal of law-enforcement methods clearly show that prosecution by itself is not the most effective technique for securing continuing compliance with health regulations. In addition, there must be full understanding of the reasons for and best methods of preventing Sanitary Code violations. The Health Department not only believes this, but has taken extensive steps to implement this principle. First, food-handling training courses were organized. Then, more teachnical courses in sanitary procedures were instituted with field inspectors utilizing much inspection time for instruction and dissemination of information to plant personnel doing the job. Soon equipment redesign programs, carried out by Health Departments with machinery manufacturers, were added to the enlightenment schemes. In this entire program, a mighty effort is being directed at building up, in food plant operators and in the ancillary industries, a thorough understanding of the principles of sanitary science. In the City of New York and in several other communities of the country, a new technique carrying this program one step further, is being applied in the enforcement of health laws. This is self-inspection.

Self-inspection of New York City food manufacturing and wholesale plants was made mandatory by the Board of Health in October 1942. The new program was allowed to develop slowly and, in July 1947 it was extended to include restaurants where it was badly needed. At the present time, because of increased production, the tightening restrictions on new equipment, the shortage of materials and the growing costs of labor and plant operations, it becomes increasingly necessary for industry and the Health Department to take appropriate steps in order to make certain that sanitation practices remain at a high level.

Self-inspection has been found to accomplish this purpose. It offers many advantages to industry. First, the food plant operator need no longer fear the Health Department. Second, under self-inspection it is possible to obtain the maximum return from sanitation dollars. A glance at the self-inspection program will show why this is so.

The law requires that self-inspection be carried out in each plant by a qualified person, either an outsider or one employed in the plant, who must make monthly inspections and report his findings on suitable forms which shall be open to review by the Health Department. In order to be able to do this work, it is necessary that the self-inspector have a thorough familiarity with the operations of the Health Department. He must know what the Sanitary Code requirements are, what official methods are used in enforcing various laws, what the administrators are currently emphasizing and what constitutes official standards of satisfactory compliance. The self-inspector can obtain this information readily from the New York City Health Department under a plan devised for that purpose.

A permanent self-inspection unit has been organized to give guidance and instruction to company self-inspectors. Where it is helpful to him, the self-inspector is permitted to accompany our official inspector on his rounds for a few days. Thus he acquires day-to-day working knowledge of the health laws and procedures, and he then becomes able to make as thorough an inspection of the plant as does the official health inspector. Now an expert in the laws, the self-inspector must make his monthly inspection and record his findings on an appropriate form. One significant question occurs at this point. When the self-inspector records a long list of violations in the plant, is the company not then vulnerable to immediate prosecution by the Health Department? Theoretically, such action is possible. However, under the scheme now in use, so long as the operator takes appropriate steps, 1) to make certain that the violations are removed within a reasonable time, and 2) to carry out a program of sanitation to prevent violations, prosecution will not follow. As a matter of fact, in this program, the Health Department finds it objectionable when the self-inspector fails to uncover and record the violations that exist in the plant.

There exists, therefore, in self-inspection, a sort of double exposure situation in which the Health Department opens up its facilities, gives training to an outside qualified person who, in turn, must bring to the light of official scrutiny and action the violations in the plant which is inspected by him. In exposing its requirements, methods and thinking to outside criticism, the Health Department is put on its mettle and must be prepared to demonstrate the need and reasonableness of its operations at all times.

The advantage of this to industry is obvious. It is a real working arrangement in which the plant operator can protest at any time the unreasonableness of requirements, the unreasonableness of interpretation or any other element of Health Department action with which he disagrees. Thus, the food plant operator under this scheme has grown up and now stands on his own feet in relation to sanitary compliance. He is now policing himself, removing violations as they occur, and carrying out a program of preventing violations.

When applied conscientiously, the operator need no longer fear the Health Department. The plant operator and health inspector are no longer opponents but now become engaged in achieving the common objective of eliminating and preventing violations. This must result inevitably in greater understanding by officials of the problems that the industrial plant must meet, and with it complete freedom of fear on the part of industry in connection with dealings with the Health Department.

The second advantage to the manufacturer in self-inspection is that under it, it is possible to obtain maximum returns from sanitation dollars. If money is spent for sanitation and the job does not get done, the self-inspector's findings will quickly bring this situation to light. The plant is geared so that violations will be prevented rather than eliminated when they occur, as is now the case. This results in a much lower sanitation budget since it is almost always cheaper to prevent violations than to remove them after they have occurred.

Another significant factor which results in spending sanitation appropriations wisely is that, under self-inspection, the specialized knowledge of all the experts in the Health Department and those in ancillary industries, along with the details of the latest developments and techniques used in other plants having similar problems are all available to the plant operator who has a self-inspector who is a sanitation specialist.

Self-inspectors have brought to light the fact that, in many cases, plants are so poorly designed and constructed that maintenance costs are far out of proportion to what they should be. In drawing plans and in the design and construction of the plant, cost, utility and production efficiency are, of course, always considered. But how often are actual and potential sanitary problems contemplated when the plans are on drawing boards, when specifications for the building are being prepared and when equipment is being purchased? The self-inspector can make certain that vital sanitation matters are considered at the most important time, in the planning stages.

How often is new equipment bought, received and set up in the plant without any consideration as to whether it can be taken apart for cleaning or can be cleaned at all, or is designed and constructed in such a manner that it is almost self-cleaning at a minimum maintenance cost? How often does the plant operator

find it necessary to seek out a new more satisfactory location in the factory for his new bottle washer or other equipment, which was installed thoughtlessly and without regard for the fact that the cost of maintenance would vary directly with the suitability of its location?

In the case of the fish dehydrating plant just mentioned, the $30,000 expenditure for a ventilating system was practically wasted, because consideration was not given to the fact that the particular building housing it presented problems which overcame any advantage from the newly installed device. This particular building was so old and so insanitary that it was not adaptable for utilization of a good ventilating system without primary treatment of the building itself coupled with introduction of a regular sanitary program for the plant.

This situation is typical of the lack of coordination, planning and integration of food plant operations with the principles of sanitary science. It is this costly defect which the self-inspector can eliminate by application of his specialized knowledge.

To obtain the full benefits of the self-inspection program, the company inspector should have academic training in sanitary science along with the specialized knowledge of food law enforcement which is provided by the Health Department. In addition, however, it would be highly desirable if the individual doing this work were to have university training in food technology and practical experience in plant operations.

The summaries of the contents of university courses reported in current issues of "Food Technology" reveal the need for the addition of sanitary science and food law enforcement methods to the curricula of food technology courses. This adjustment not only promises marked benefits in the advancement of the work of the self-inspector, but also must be of great value to the food technologist in the practical day-to-day application of his specialty.

Advantages accrue to the Health Department as well as to industry with the self-inspection plan. This has been borne out by our experiences in the City of New York. In order to avoid any misunderstanding, it should be pointed out that self-inspection is not a substitute for official inspection. The Health Department still continues to bear the responsibility for making certain that its permit holders and other establishments under its jurisdiction comply with all the laws. With self-inspection, this tremendous task is borne jointly by industry and the Health Department, utilizing the best skills of both groups to the great advantage of the consuming public, the industry itself and good government.

Gelation and Clarification in Concentrated Citrus Juices. II. Effect of Quantity of Pulp in Concentrate Made from Seedy Varieties of Fruit [a,b]

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(Manuscript received July 10, 1951)

The quantity of pulp in concentrated citrus juices is shown to be a factor affecting gelation and clarification in these products. Data are presented showing degree of gelation, degree of clarification, pectinesterase activity, and coarse pulp content in experimental packs of Pineapple orange concentrate and Duncan grapefruit concentrate. A practical procedure for determining and grading the degree of gelation in citrus concentrate is also presented.

In the commercial manufacture of frozen citrus concentrate, juice is concentrated to 55-58° Brix and then cut back to 42° Brix with freshly extracted pulpy juice prior to freezing. Since pectic enzymes and pectic substances that cause gelation and clarification *(4)* are associated with the insoluble solids in the pulp of citrus juices, it was assumed that the quantity of pulp present in frozen concentrated juices would be a major factor causing gelation and clarification of these products. The following research was planned to determine if this were true.

EXPERIMENTAL PROCEDURES

Preparation of Concentrates. Citrus concentrates containing varying amounts of pulpy cut-back juice were processed in the pilot plant at the Florida Citrus Experiment Station. Two seedy varieties of fruit, Pineapple oranges and Duncan grapefruit, were used and two experimental runs were made with each variety.

The juice was extracted using a Citro-Mat * extractor and then passed through a finisher using a 0.027 inch screen, after which it was concentrated to 55° Brix in the pilot plant evaporator *(1)*. The pulp and seeds that did not pass through the 0.027 inch screen were mixed with a small quantity of juice and then rescreened through a 0.125 inch screen using the same finisher. Pulpy cut-back juices for mixing with the 55° Brix concentrate were obtained by mixing varying amounts by volume of the pulpy juice passing through the 0.125 inch screen with varying amounts of juice from the 0.027 inch screening operation. Thus by the addition of pulpy cut-back juices containing varying amounts of pulp to 55° Brix concentrate from the same batch, 42° Brix concentrates were obtained which contained varying amounts of pulp.

[a] Presented at the Eleventh Annual Meeting of the IFT, New York, N. Y., June 19, 1951.

[b] Cooperative research project of Florida Citrus Commission and Florida Citrus Experiment Station, Lake Alfred, Florida. Florida Agricultural Experiment Station Journal Series No. 9.

[c] Florida Citrus Experiment Station.

[d] Florida Citrus Commission.

* Furnished and serviced by Bireley's Division, General Foods Corporation.

Four series (6 packs each) of 42° Brix concentrates were made from a thoroughly mixed lot of fruit by processing juice that was extracted at different times by using both a low (approximately 25 p.s.i.g.) and a high (approximately 65 p.s.i.g.) extraction pressure on the Citro-Mat. By so doing it was possible to obtain 55° Brix concentrate from juice extracted by both low and high pressures. Low-pressure and high pressure pulpy cut-back juices also were made; therefore, for each variety of fruit used it was possible to secure 24 packs (Figure 1) by mixing 55° Brix concentrates made from juice

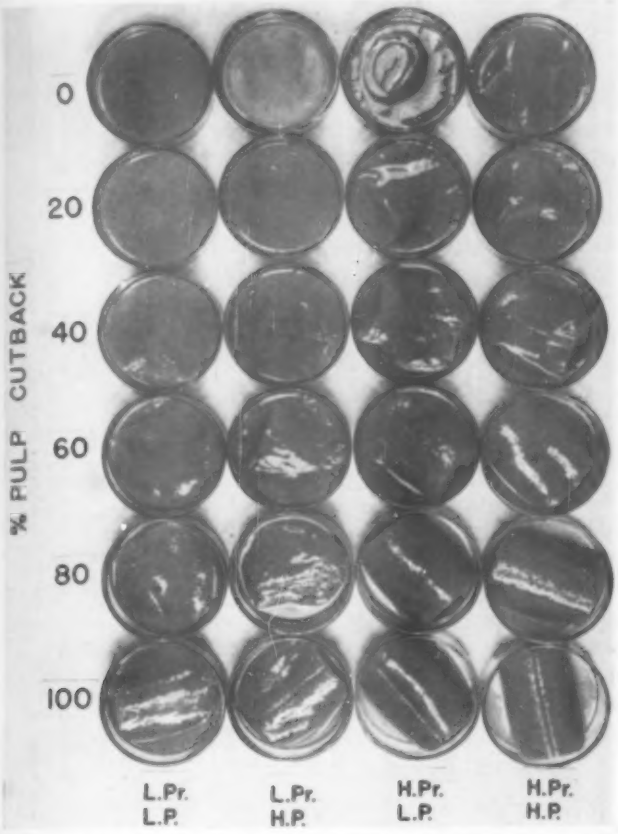

FIGURE 1. Gelation in Duncan grapefruit concentrates made from juice extracted by low and high extractor pressures and containing various quantities of pulp. Percent Pulp Cut-back indicates the percent by volume of pulp that passed through 0.125 inch screen which was mixed with juice, that passed through 0.027 inch screen, to give cut-back juice that was mixed with 55° Brix concentrate to make a 42° Brix product. See Tables 1 and 2 for data. L. Pr., low pressure extraction; H. Pr., high pressure extraction; L. P., pulp from juice by low pressure extraction; and H. P., pulp from juice by high pressure extraction.

extracted by low or high pressures with low or high-pressure pulpy cut-back juices.

Low-pressure extraction yielded a pulpy cut-back juice in which the pulp consisted chiefly of juice sacs, whereas the juice from the high-pressure extraction yielded pulp consisting of juice sacs, albedo and rag particles, and gelatinous seed material. Also, the pulp secured from the high-pressure extraction contained less juice and, therefore, a larger percentage of insoluble solids than that secured from the low-pressure extraction. The type of pulp secured is also dependent upon the construction and operation of both the juice extractor and the finisher, and the yield of juice obtained is affected by both the extraction and finishing procedures used.

Analytical Methods. The citrus concentrates prepared were frozen and later examined for pulp content, gelation, clarification, and pectinesterase activity.

The coarse pulp content of the concentrate was determined by placing the contents of a 6 oz. can on a No. 200 standard Tyler stainless steel screen and washing it repeatedly with water. Fine particles of pulp that passed through the screen were lost. The coarse pulp retained by the screen was resuspended in water in a 500 ml. graduated cylinder (Figure 2) and its volume was measured after standing for 10 minutes. Measurement of coarse pulp content by this screening procedure gave more accurate and reliable data than a centrifugal method *(3)*.

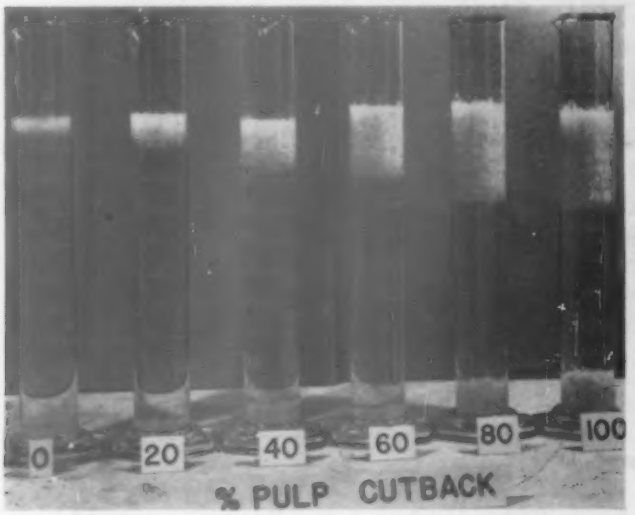

FIGURE 2. Coarse pulp obtained from Duncan grapefruit concentrates. Pulp resuspended in water in 500-ml. graduated cylinders after separation from concentrate. See Table 1 for data.

The frozen concentrates were examined for gelation by removing cans from storage at —8° F. (—22.0° C.) and storing for 24 hours at 80° F. (26.5° C.), after which the cans were opened and the degree of gelation was observed by visual inspection, as shown in Figure 3.

The initial turbidity or "cloud" of the reconstituted juices was determined by measuring the percentage of light transmission through a sample of the juice after centrifuging for 15 minutes at 1700 r.p.m. in an International Centrifuge, Size 1, Type SB. A Fisher Electrophotometer with a No. 650 filter and 23 ml. cylindrical absorption cell was used to measure the percentage of light transmission. The concentrate was reconstituted immediately after removal from frozen storage with deionized water warmed to 110-120° F. (43.0-49.0° C.). The degree of clarification in the reconstituted juices was determined again after the concentrates had been held in running water at 70-80° F. (21.0-26.5° C.) for several hours, as indicated in Table 2.

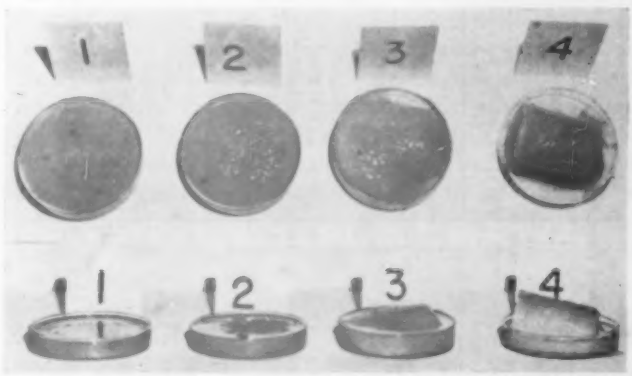

FIGURE 3. Gelation in citrus concentrates. Illustration of the degree of gelation indicated by numerical scores. No gelation is indicated by 0 (none). When questionable or very slight gelation is observed, 1 (very slight) is used. The number 2 (slight) indicates definite gel lumps; 3 (semi-gel), definite gel which holds to shape of can but breaks up partially upon pouring into another container; and 4 (solid gel), a gel which retains shape of can upon being placed into another container.

TABLE 1

Effect of quantity of pulp and juice extractor pressure on degree of gelation and pectinesterase activity of concentrated citrus juices

Juice extractor pressure:		Low pressure extraction [f]						High pressure extraction [g]					
Pulp in cut-back juice from low pressure extraction [h]					Pulp in cut-back juice from high pressure extraction [i]			Pulp in cut-back juice from low pressure extraction [h]			Pulp in cut-back juice from high pressure extraction [i]		
Cut-back juice used		Coarse pulp in concentrate [j]	Degree of gelation in concentrate after 24 hr. at 80° F. (26.5° C.)	Pectin-esterase activity [k]	Coarse pulp in concentrate	Degree of gelation in concentrate after 24 hr. at 80° F. (26.5° C.)	Pectin-esterase activity	Coarse pulp in concentrate	Degree of gelation in concentrate after 24 hr. at 80° F. (26.5° C.)	Pectin-esterase activity	Coarse pulp in concentrate	Degree of gelation in concentrate after 24 hr. at 80° F. (26.5° C.)	Pectin-esterase activity
Juice passing through 0.027 inch finisher	Pulp passing through 0.125 inch finisher												
Volume used %	*Volume used* %	*ml./100 g.*			*ml./100 g.*			*ml./100 g.*			*ml./100 g.*		
Duncan Grapefruit													
100	0	13	None	4	12	None	5	16	Slight	5	18	Slight	7
80	20	45	Very slight	5	50	Very slight	7	38	Slight	8	42	Slight	9
60	40	54	Slight	11	79	Slight	9	70	Slight	8	74	Semi-gel	10
40	60	86	Slight	11	98	Slight	10	97	Semi-gel	10	99	Solid gel	12
20	80	111	Slight	13	109	Slight	10	110	Solid-gel	14	109	Solid gel	13
0	100	142	Semi-gel	16	142	Semi-gel	15	127	Solid-gel	14	122	Solid gel	15
Pineapple Orange													
100	0	12	None	10	17	None	11	13	None	11	21	None	12
80	20	49	None	12	41	None	13	26	Slight	11	47	Slight	14
60	40	82	None	16	65	Slight	15	67	Slight	16	72	Slight	17
40	60	94	Slight	18	105	Slight	19	84	Slight	15	102	Semi-gel	20
20	80	102	Slight	18	128	Slight	19	98	Semi-gel	17	130	Semi-gel	24
0	100	128	Slight	18	179	Semi-gel	24	130	Semi-gel	19	164	Semi-gel	26

[f] In Figure 1 indicated by L. Pr. [g] In Figure 1 indicated by H. Pr. [h] In Figure 1 indicated by L. P. [i] In Figure 1 indicated by H. P.
[j] Volume of coarse pulp in concentrate from 1-6 oz. can determined as shown in Figure 2.
[k] Pectinesterase activity per g. soluble solids (° Brix).

TABLE 2

Effect of quantity of pulp and juice extractor pressure on degree of clarification of concentrated citrus juices

Juice extractor pressure:		Low pressure extraction [l]								High pressure extraction [m]							
Pulp in cut-back juice from low pressure extraction [n]						Pulp in cut-back juice from high pressure extraction [o]				Pulp in cut-back juice from low pressure extraction [n]				Pulp in cut-back juice from high pressure extraction [o]			
Cut-back juice used		Clarity of reconstituted juice				Clarity of reconstituted juice				Clarity of reconstituted juice				Clarity of reconstituted juice			
		Initial [p]		After holding [q]		Initial		After holding		Initial		After holding		Initial		After holding	
Juice passing through 0.027 inch finisher	Pulp passing through 0.125 inch finisher	Cloud [r]	Degree of clarification [s]	Cloud	Degree of clarification	Cloud	Degree of clarification	Cloud	Degree of clarification	Cloud	Degree of clarification	Cloud	Degree of clarification	Cloud	Degree of clarification	Cloud	Degree of clarification
Volume used %	*Volume used* %																
Duncan Grapefruit																	
100	0	10	None	15	None	11	None	14	None	10	None	43	Definite	10	None	51	Definite
80	20	10	None	22	Slight	10	None	20	Slight	11	None	44	Definite	10	None	51	Definite
60	40	10	None	26	Slight	11	None	39	Definite	10	None	51	Definite	10	None	57	Definite
40	60	<10	None	38	Definite	10	None	40	Definite	11	None	59	Definite	10	None	63	Extreme
20	80	<10	None	47	Definite	10	None	51	Definite	11	None	59	Definite	15	None	63	Extreme
0	100	<10	None	53	Definite	10	None	54	Definite	13	None	61	Extreme	12	None	63	Extreme
Pineapple Orange																	
100	0	21	Slight	33	Slight	20	Slight	28	Slight	22	Slight	28	Slight	22	Slight	33	Slight
80	20	21	Slight	41	Definite	24	Slight	33	Slight	32	Slight	50	Definite	19	None	36	Slight
60	40	34	Slight	55	Definite	31	Slight	43	Definite	33	Slight	62	Extreme	26	Slight	47	Definite
40	60	34	Slight	64	Extreme	36	Slight	53	Definite	47	Definite	70	Extreme	38	Slight	65	Extreme
20	80	48	Definite	69	Extreme	45	Definite	68	Extreme	55	Definite	75	Extreme	41	Definite	67	Extreme
0	100	38	Slight	67	Extreme	47	Definite	75	Extreme	51	Definite	76	Extreme	34	Slight	72	Extreme

[l] In Figure 1 indicated by L. Pr. [m] In Figure 1 indicated by H. Pr. [n] In Figure 1 indicated by L. P. [o] In Figure 1 indicated by H. P.
[p] Frozen 42° Brix concentrate removed from storage at —8° F. (—22.0° C.), immediately reconstituted (1:3 by Volume) with deionized water at 110-120° F. (43.0-49.0° C.), and "cloud" immediately determined.
[q] Frozen 42° Brix concentrate removed from storage at —8° F. (—22.0° C.), held in can in running water at 70-80° F. (21.0-27.0° C.) for 3 hr. (grapefruit) or 2 hr. (orange), then reconstituted (1:3 by volume), and the "cloud" immediately determined.
[r] Cloud of reconstituted juice determined on sample after centrifuging for 15 minutes at 1700 r.p.m. (International Centrifuge, Size 1, Type SB). Light transmission measured using a Fisher Electrophotometer with

Pectinesterase activity was determined by essentially the method of Kertesz *(2)*. Fifty g. of substrate, a 1.0% citrus pectin solution containing 0.2 *M*. NaCl, was placed in a 150 ml. beaker. One to five ml. of reconstituted juice, according to the activity of the sample, were added to the substrate, and the mixture was stirred and rapidly titrated to pH 7.0 with 0.1 *N*. NaOH. The mixture was then maintained at a temperature of 30° C. (86.0° F.) and titrated with 0.05 *N*. NaOH to pH 7.0 at 10 minute intervals for a total reaction time of 30 minutes. The pectinesterase activity reported in Table 1 is expressed as the milligrams of methoxyl split off by the enzyme per gram of soluble solids. The soluble solids of the reconstituted juice was determined by using a refractometer with a Brix scale.

EXPERIMENTAL RESULTS AND DISCUSSION

Data secured pertaining to the relationship between the pulp content and the degree of gelation and pectinesterase activity of citrus concentrates are presented in Table 1; results relative to clarification are shown in Table 2. The degree of gelation in 24 packs of Duncan grapefruit concentrate that contained varying amounts of pulp is illustrated in Figure 1. It is evident from the data that pectinesterase activity and degree of gelation and clarification are dependent upon amount of pulp in the concentrates. Pectinesterase activity and degree of clarification were higher in Pineapple orange than in Duncan grapefruit concentrates; however, the degree of gelation was higher in grapefruit than in orange concentrates.

In respect to gelation, Figure 1 illustrates what will happen in commercial operation if the pulp content is increased or if the pressure used for juice extraction is increased. It should be pointed out that the same effect may take place when juice extractors other than the Citro-Mat are used; however, experimental data have not yet been obtained using other types of extractors.

The variation in the degree of gelation, as shown for grapefruit concentrates in Figure 1, may be caused by two factors; (1) insoluble solids in the pulp and (2) soluble pectic substances in the juice extracted from the peel of the fruit or the pulp when high extractor or finisher pressures are used. Accurate determination of pulp, insoluble solids, and soluble pectin in these concentrates will be necessary before conclusions can be drawn as to the relative importance of each of these factors in causing gelation and clarification. To overcome the difficulties that have been experienced in obtaining accurate determinations of pulp, insoluble solids, and pectin content, improved methods for making such determinations on pulpy citrus concentrates are being investigated at present.

SUMMARY

Pectinesterase activity and degree of gelation and clarification in concentrated citrus juices made from the two seedy varieties, Pineapple orange and Duncan grapefruit, increased as the amount of pulp in the concentrates was increased.

Pectinesterase activity and degree of clarification were higher in Pineapple orange concentrates than in Duncan grapefruit concentrates, but the firmness of the gels formed was more pronounced in the grapefruit concentrates.

LITERATURE CITED

1. Atkins, C. D., Wenzel, F. W., and Moore, E. L. Report new technical strides in design of FCC evaporator. *Food Inds.*, 22, 1353 (1950).
2. Kertesz, Z. I. Pectic enzymes. The determination of pectinmethoxylase activity. *J. Biol. Chem.*, 121, 589 (1938).
3. U. S. Standards for grades of canned concentrated orange juice. Mimeo. U.S.D.A., P.M.A. August, 1943.
4. Wenzel, F. W., Moore, E. L., Rouse, A. H., and Atkins, C. D. Gelation and clarification in concentrated citrus juices. I. Introduction and present status. *Food Technol.*, 5, 454 (1951).

Book Review

The Principles and Practice of Cider Making. A translation of the third (1928) edition of G. Warcollier's *La Cidrerie*, by V. L. S. Charley assisted by Pamelia M. Mumford. With additional (British) illustrations, deletions and supplementary notes by the translators. 367 pages, 86 illustrations. Leonard Hill Ltd., London, 1949. Price 35s. 9d (About $6.50 in the U. S.).

This is a warning as much as a review. The above book is advertised by the publisher as "The principles and practice of cider making, by Dr. V. L. S. Charley, First edition, 1950, Illustrated, etc." The book on its outside cover carries the same title, the names of V. L. S. Charley and that of the publisher. Not until the lower part of the inside title page does the reader realize the fact that this is a translation of a book published over twenty years ago.

This reviewer thinks highly of Dr. Charley and of his important contributions to fruit technology. Thus his dominant feeling is disappointment that this is not an original book by one of the world's foremost fruit juice experts. As for the ethics of printing and advertising the book in the above manner, we will let the reader draw his own conclusions.

Warcollier's *La Cidrerie* is, of course, one of the classics of fruit juice technology. Having it available in English will provide important background for those interested in hard (fermented) cider and perry. While the historical information is of interest, the technical and especially the mechanical features discussed are often quite out of date. It would seem that Dr. Charley could have left out a great deal more of the original text without depriving the reader in 1951 of information of value. Brief notes are appended by Dr. Charley at the ends of some chapters and some up-to-date references are also quoted.

In addition to the production of fermented apple juice (hard cider), sweet cider (apple juice) is also dealt with (38 pages) and here the "Translator's Addenda" further whets our appetite for more discussion of this topic by Dr. Charley and his associates. Sparkling ciders and various by-products as apple pomace and other residues and distilled cider products (apple brandy) are also discussed. It would have been

kinder to Professor Warcollier to leave out entirely his discussion of pectin extraction but fortunately Dr. Charley comes to the rescue with a fine brief "Addenda."

The printing is good and the illustrations (especially those introduced into this English translation) are of interest to U. S. technologists. The index is far too incomplete and one wonders how an index for a fruit juice book printed in 1949 can be without the words "Seitz" and "Boehi."

Z. I. KERTESZ.

ACTIVE CARBON. By John W. Hassler. 384 pages. Chemical Publishing Company, Brooklyn, N. Y., 1951. Price $7.00.

This is a fine book and one in which the author has used the excellent judgment provided by 35 years of experience in the field as a background for discussing briefly but adequately all of the factors which are concerned with the theoretical and practical understanding of active carbon. This is not to say that all of the mysteries of this important and versatile substance are explained, but certainly both those concerned with industrial applications and those who wish an introduction to the field are provided with the kind of discussion of the variables which should enhance their appreciation of active carbon.

Too often, as the author points out, insufficient attention is paid to the specific character of an active carbon as well as the nature of the job it is to do and the assumption is made that all active carbons will adsorb in the same fashion.

Careful attention to the table of contents will change this attitude. The book is divided into three parts: (1) Preparation and Properties, (2) Applications and (3) Experimental Methods. In the first part preparation of active carbons is discussed as well as factors influencing adsorption. The various theories of adsorption are handled in sufficient detail for this type of compilation. Such diverse applications as fats and oils, water purification, air purification, chemical recovery as well as many others are described in part two. Part three should provide the uninitiated with sufficient information to set up a proper experimental study for a particular application of active carbon.

The physical format of the book is generally good. The index is well handled, the typography is good, and references are grouped at the end of each chapter which is helpful.

S. M. CANTOR.

THE CALIFORNIA WINE INDUSTRY. A STUDY OF FORMATIVE YEARS. 1830-1895. By Vincent P. Carosso. 241 pages. University of California Press, Berkeley and Los Angeles, California, 1951. Price $3.75.

To a student of California's history this book will give a useful outline of the origin and growth of one of this state's most important industries. It provides especially good information on economical and legislative aspects of California's viticultural and vinicultural development.

However, as soon as the author ventures into the field of technology, his lack of technical knowledge becomes a handicap. To pick a few samples at random: on page 46, speaking about mildew and "a vine pest" (without specifying which one) he gets obviously confused by two different diseases, powdery mildew which can be controlled by sulfur, and dawny mildew which is controlled by copper compounds. Throughout the book he mentions several times that European varieties of grapes, when grown in California, should give wines of the same quality as these varieties give when cultivated in Europe. This assumption is of course not justified by the theory or practice of wine making, since not only have different conditions of soil and climate a very important influence, but even in the same vineyard the quality of the wine often varies with exposure, elevation, drainage, etc. On page 101, speaking of the heavy body and high alcohol content of California wines, the author says: "the fault was not in the wine, but with the manufacturers and dealers." This judgment is certainly no more justified than would be an assumption that by the use of proper winemaking techniques Algerian wines could be made as light in body, color, and alcohol content as the wines of Bordeaux.

It is perhaps regrettable that, despite frequent use of French words and quotations (which goes even as far as to use both the French "vigneron" and the English "vintner" or "vineyardist" on the same page), the author makes very little use of French sources in general, and in particular ignores completely the works of P. Viala and L. Ravaz concerning hybrids and resistant root-stocks which are considered classical by viticulturists all over the world.

There are also indications that, after a considerable amount of information was gathered, the book was rather hastily put together, which has prevented the author from eliminating repetitions occurring in different chapters, as well as some contradictory statements which can be sometimes quite confusing. For instance, on page 73 the author states that "the restricted California wine market of the 'sixties and 'seventies" was one of the main difficulties of a large winemaking establishment; however, on page 76 he speaks of a "large demand for and the small supply of wine," only to state a few lines lower, that "conservative wine men stated that the demand for wine would not exceed the supply for at least a century."

Sometimes confusion seems to come from unsatisfactory proof-reading, as for instance spelling "Reisling" and "Traminier" instead of generally accepted "Riesling" and "Traminer." Sometimes it comes from a certain negligence in the use of terms, like on page 134, where the word "criteria" is used when "prerequisites" are meant. Or, in another instance, the author writes of the "noble" work of Haraszty right next to describing Haraszty's use of Chinese labor because it was 4 times cheaper than white labor and was in a condition close to slavery.

Despite all these faults, this little book can be of considerable value to anybody interested in certain aspects of agricultural and industrial development of California in the second part of 19th century. It is extensively documented and annotated, its bibliography is quite complete, and it has a comprehensive index. It is handsomely printed and its format is handy.

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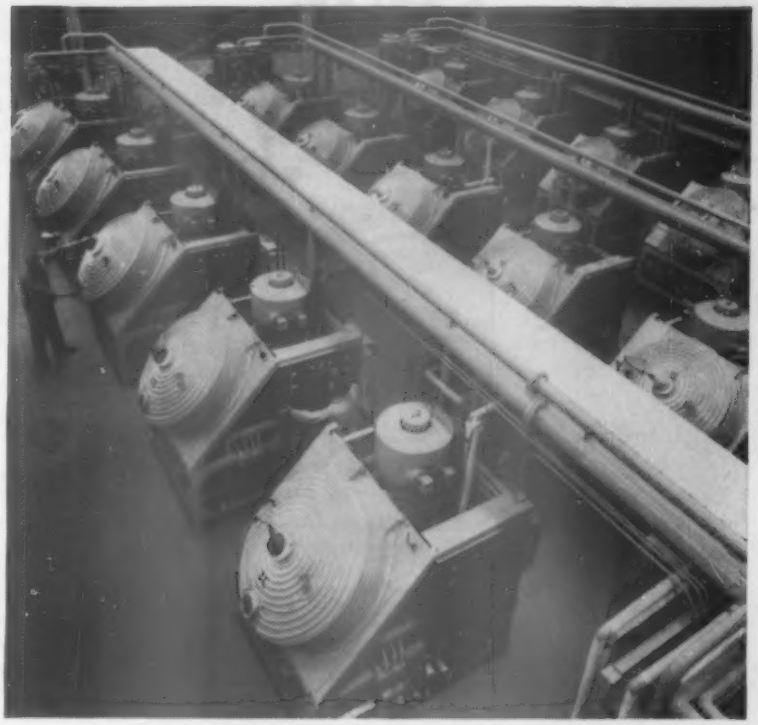

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Selected Abstracts

ANALYTICAL METHODS

Determination of caffeine. A rapid semi-micromethod.

BOWER, R. S., ANDERSON, A. D., AND TITUS, R. W. *Anal. Chem., 22,* 1056-8 (1950).

A semi-micromethod for the determination of caffeine in coffee and tea has been developed requiring only 15 to 25% of the time necessary for official A. O. A. C. methods, with no sacrifice in precision. Method based on water extraction with MgO, chloroform extraction of the caffeine and measurement of total N by Hengar method.

A modified brucine method for the determination of nitrate. Application to meat and soil.

MACDOUGALL, D., AND ROADHOUSE, F. E. *Canadian J. Res., 28F,* 280-6 (1950).

A modified brucine method for the determination of small amounts of nitrate in biological material is described. Error due to instability of the reagent has been overcome by dissolving the brucine in 91% ethanol. A 10% solution of the alkaloid was found to be most satisfactory and was stable for up to a year. Less color is developed with the ethanol solution than with other commonly used solvents and the effective working range of the method is thus increased approximately five times. Chloride does not interfere seriously, but nitrite must be removed (by adding urea and boiling) prior to the determination. Organic matter in the sample may char slightly when the concentrated sulfuric acid is added, but this error is compensated for by appropriate blanks. The method has been applied successfully to cured meat and to soils, and excellent recoveries of added nitrate have been obtained. The results agree with those obtained by the gasometric method, but are higher than those obtained by the phenoldisulphonic acid procedure.

The estimation of chitin and chitin nitrogen in crawfish waste and derived products.

BLACK, M. M., AND SCHWARTZ, H. M. *Analyst, 75,* 185-9 (1950).

The determination of chitin and chitin N_2 in crawfish waste and derived products has been subjected to critical study. Chitin is isolated and either weighed as such or its N_2 content determined. The precision of the proposed method is 0.5% of the mean on crude sample and $\pm$ 3% of the mean on meals. The method is similar to the A. O. A. C. crude fiber method. The chitin, chitin N_2 and total N_2 content of a number of crawfish meals are reported and the importance of making a correction for chitin N_2 when calculating the protein content of such meals is stressed.

A micro method for separating free and esterified vitamin A.

EDEN, E. *Biochem. J., 46,* 259-61 (1950).

A micro method using aluminium oxide as adsorbent has been devised for separating vitamin A alcohol from the esterified form. Under the conditions of the method, vitamin A ester in light petroleum passed through the column, whereas vitamin A alcohol was adsorbed and could be eluted with 20% acetone in light petroleum. The separation proved to be satisfactory either for artificial mixtures or biological extracts fortified with vitamin A alcohol or ester.

BIOLOGICAL SCIENCES

NUTRITION

The effect of adding APF supplements and concentrates containing supplementary growth factors to a corn-soybean oil meal ration for weanling pigs.

DYER, I. A., TERRILL, S. W., AND KRIDER, J. L. *J. Animal Sci., 9,* 281 (1950).

Weanling pigs fed a 20% crude protein corn-soybean oil meal basal ration in dry lot gained significantly faster when Lederle's APF supplement was added to the ration. Supplementing the basal ration with Lederle's APF supplement caused a 5% feed efficiency saving.

(Continued on page 8)

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Regional Section News

PHILADELPHIA SECTION

The November meeting was held on November 16 at the Drexel Institute of Technology, Men's Faculty Club, and was preceded by a dinner. S. W. Arenson, Director, Food Development Laboratory, Baltimore, Maryland, was the speaker. His topic: "Ingredient Requirements and Standardization in the Food Industry." As a consultant, Mr. Arenson has been in close touch with all phases of the food field and is especially well-equipped to discuss his subject. He holds degrees from the University of North Carolina and has studied at the Universities of Maryland and Colorado. In 1948, Mr. Arenson was chairman of the Maryland Section of the I. F. T., and has also been active in the New York Section.

MARYLAND SECTION

The October meeting was held on October 13 at the University of Maryland, College Park. Members of the Section had the opportunity of learning about the food research activities of the University by means of conducted tours during the afternoon prior to the meeting. The evening session started with a dinner, after which Victor R. Boswell, Head of the Vegetable Crops and Diseases Section of the Bureau of Plant Industry, Soils and Agricultural Engineering of the U. S. Department of Agriculture talked on "The Origin and History of Some Important Food Plants," a phase of food technology that was completely new to most members of the Section.

The November meeting was held on the 10th at the Stafford Hotel in Baltimore. The speaker was E. J. Cameron, Director, National Canners Association, Washington, D. C. His subject: "Recent Developments in Methods of Preserving Canned Foods."

The December meeting was held on the first at the Hotel Stafford in Baltimore, Maryland. Maurice Siegel, Chairman of the Section, spoke on "Expert Testimony." Mr. Siegel's many appearances in court,—as an expert witness and food authority, we hasten to point out,—makes him particularly qualified to speak on this subject. Because of the ever increasing enforcement of food laws, what Mr. Siegel had to say was of interest to all branches of the food industry represented at the meeting.

NORTHEAST SECTION

The November meeting was held on the 2nd at Graduate House, Massachusetts Institute of Technology. Prior to the dinner and meeting, there was an inspection tour. The evening meeting consisted of two addresses, the first by William Horton of the First National Stores who talked on "Keeping Produce Alive." Mr. Horton, a graduate of Boston University, has been in the fresh fruit and produce field for about 20 years, and for the past 3 or 4 years has been First National Stores' buyer of all fruit and produce in Maine, New Hampshire and Vermont. He is also chairman of the Packaging Committee of the Maine Apple Producers' Commission. The second address was by B. E. Proctor, Director, Food Technology Laboratories, M. I. T. Professor Proctor has spent many years in food technology, and is the author of many scientific papers on the subject. He is one of the mainstays of I. F. T. having served in many capacities in both the National and local groups.

The Section agreed unanimously to invite I. F. T. to Boston for the National Meeting in 1953.

Further progress has been made relative to the establishment of the Samuel Cate Prescott Award in Food Technology. Professor Proctor is chairman of the Committee working on this, and is being assisted by L. P. Abare and S. P. Hurley. Final details will be announced later.

NORTHERN CALIFORNIA SECTION

The October meeting was held on the 19th at the El Jardin Restaurant in San Francisco. The local section of the American Association of Cereal Chemists joined in the meeting. The speaker of the evening was Leo Kline of the Bureau of Agricultural and Industrial Chemistry's Western Regional Research Laboratory at Albany, California. His subject: "Improved Dried Eggs for Direct Use and for Cake-Mix Use."

The Executive Committee met on November 2nd with 16 present. Among the subjects discussed was Carroll's book "Understanding our Environment," a text for California schools. It was pointed out that the book contains several gross errors reflecting on the canning industry. Arrangements are being made to send a letter to the California State Board of Education pointing out the damage which a book of this type may do.

At a recent meeting of the Executive Committee the Section decided to send the following letter to all Sections of the I. F. T. The communication was signed by Ernest E. Jacobs, Chairman of the Section.

"Recently at an Executive Committee meeting of our Section, the group was discussing what could be done for the benefit of Institute members in general and members of our Section in particular.

"There were several suggestions, but in my opinion the one most worthy of consideration was offered by Mr. Ed Mitchell of Richmond Chase Company. Ed stated that he had recently changed the method of signing his correspondence. For a number of years he used the title 'Chief Chemist.' He feels that the type of work that he is doing is not properly described by this title and he is now using the title 'Chief Food Technologist.'

"All of us thought that this was an excellent idea because there are only a minority of cases in which a man employed in food plants today is strictly a chemist, bacteriologist or microbiologist. We did think that 'Food Technologist' more completely describes our functions.

"It was the thought of the Executive Committee that I, as Chairman of the Section, should bring this to the attention of every other Section of the Institute. You, in turn, might care to discuss this with your Executive Committee or at a general Section meeting with the idea that where the term 'Food Technologist' does apply this title be used in preference to 'Chemist,' etc.

"We are aware that there may be cases where management would not permit such a title or where the individual himself would not care to use it, but I think that you will agree that this

(Continued on page 12 following technical papers)

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Abstracts

(Continued from page 2)

Supplements for cottonseed meal in diets for chickens.

HEYWANG, B. W., AND BIRD, H. R. *Poultry Sci., 29,* 486-95 (1950).

The results of the first three experiments show that sardine meal is greatly superior to cottonseed meal as a source of protein in diets for growing chickens. Cottonseed meal is deficient in a factor found in dried cow manure, probably vitamin B_{12}, but it is much more deficient in some other factor, or factors, occurring in sardine meal. In the last three experiments with growing chickens, the progeny of breeders receiving in their diets 30% cottonseed meal and 5% dried cow manure were fed diets supplemented with 0, 0.5, or 0.8% DL-lysine. The results show that cottonseed meal is deficient in lysine. The supplementary value of sardine meal was probably due at least in part to its lysine content.

The effect of fat level of the diet on general nutrition. VI. The interrelation of linoleate and linolenate in supplying the essential fatty acid requirement in the rat.

GREENBERG, S. M. et al. *J. Nutr., 41,* 473-86 (1950).

A sex difference in the requirement for linoleic acid has been found. The optimum dosage for male rats exceeds 50 mg. daily, while for the female rats it was 10 to 20 mg. per day. Linoleic acid had only slight growth-promoting action when fed alone to fat-depleted rats. However, when fed suboptimum doses of linoleic acid, the resultant activity of the additional linolenate equalled that of linoleate.

Observations on the prolonged feeding to rats of the flour maturing agent, ammonium persulfate.

ARNOLD, A., AND GOBLE, F. C. *J. Nutr., 41,* 459-72 (1950).

It was shown that bread made with persulfate in amounts far in excess of those needed for maturing, produced no untoward effects in rats, and since flour consumed in significant amounts is ordinarily moistened in some way before ingestion, thus changing ammonium persulfate to ammonium sulfate, and since the dry flour in these experiments contain 10 to 15 times the normal amount of persulfate as given normally by use in bread, it is concluded that ammonium persulfate may be used with safety at the levels ordinarily required for the commercial treatment of flour.

Effect of adding soy flour upon the protein value of baked products.

REYNOLDS, M. S., AND HALL, C. *J. Am. Diet. Assn., 26,* 584-9 (1950).

In rat growth studies in which the baked products constituted the sole source of protein, the rats fed the products containing soy flour showed greater average growth in every case than those on the same mixture with an equivalent percent of protein but without soy flour. Protein efficiency and body nitrogen storage were also higher in every case in which the soy-containing mixture was fed. The results of nitrogen balance studies on human subjects who received 80% of their protein from the yellow cakes were inconclusive.

The effect on chick growth of supplementing a vegetable protein diet with an APF concentrate.

SHERWOOD, R. M., AND COUCH, J. R. *Poultry Sci., 29,* 501-07 (1950).

Soybean oil meal and cottonseed meal of low gossypol content may each be used as the sole source of protein for growing chicks when properly supplemented. Soybean oil meal supplemented with 1% Lederle APF concentrate supported growth equivalent to that obtained with 4% fish solubles under the same conditions. On the other hand, it was necessary to supplement cottonseed meal with DL-lysine and an APF concentrate or fish solubles when this feed was used as the protein source.

Effect of cocoa on protein utilization.

REYNOLDS, M. S., AND BEYER, R. A. *J. Am. Diet. Assn., 26,* 590-1 (1950).

Rats fed devil's food cake (cocoa, 4% of the ration) grew less well than rats fed plain cake, the protein efficiency and nitrogen storage efficiency being lower in the rats fed devil's food cake.

VETERINARY MEDICINE

Control of body and breath odors with chlorophyll fractions.

SERLING, M. E. *Vet. Med., 45,* 291-2 (1950).

Chlorophyll fractions, given orally, 100 mg./25 lb. body weight aid in eliminating most objectionable body and mouth odors in dogs within 18-24 hours. In proper dosages, chlorophyll fractions are non-toxic, well tolerated, and apparently do not affect normal digestive activities. Tests conducted on human subjects proved chlorophyll effective in control of halitosis.

FOOD PRODUCTS

BAKING AND BAKERY PRODUCTS

Cake properties in relation to flour particle size fractions.

SHELLENBERGER, J. A., WICHSER, F. W., AND LAKAMP, R. C. *Cereal Chem., 27,* 106-13 (1950).

Patent, straight, and clear grade flours milled from an Ohio soft red winter wheat were fractionated into three particle size groups measured by diameters of 37μ or less, over 37μ up to and incl. 53μ and larger than quantity of coarse material increased as the flour grade decreased. The properties of the different particle size fractions from each grade of flour varied widely. The 0-37μ fractions for each flour were lowest in protein, ash, and viscosity and produced the best cakes. The fractions containing the largest sized particles were intermediate in protein and ash content, had the highest viscosity, and produced the poorest cakes. The 37-53μ fractions were highest in protein and ash content, and intermediate in viscosity and cake baking quality.

The decomposition of potassium iodate during the baking of bread.

CONN, J. B. et al. *Cereal Chem., 27,* 297-31 (1950).

Potassium iodate containing radioactive iodine (I^{131}: half-life 8.0 days) was used to determine the fate of iodate during the baking of bread. Bread samples baked from dough containing radioactive potassium iodate were extracted with ammoniacal methanol to recover iodate and iodide. Protective carriers were added to facilitate the separation of these salts, and to minimize the extent of the side reactions of these components occurring during the extraction process. Iodide and iodate fractions, fat fractions, extracted bread solids, and oven gases were examined for radioactivity. Less than 7.5% of the original 3.5-4 p.p.m. iodate is left in the baked bread. The major decomposition product is iodide.

Molecularly distilled monoglycerides. II. Cake baking experiments.

KUHRT, N. H., AND WELCH, E. A. *J. Am. Oil Chem. Soc., 27,* 344-6 (1950).

Different types of monoglycerides have been shown to possess marked differences in their activity in cake baking. Improved activity has been observed when the monoesters made from fats containing unsaturated acids were used. The activity of a distilled monoglyceride would be expected to be proportional to its monoester content or about 2.2 times more active than the reaction mixture. It has been shown however that, at practical concentrations in an experimental cake, the distilled monoesters were considerably more active than expected. This greater activity has been shown to be due primarily to the absence of the diester.

FATS AND OILS

Cocoa butter.

BROUHNS, G. *Olearia (Belgium), 2,* 309 (1948); *Food Sci. Abst., 22,* 99, No. 456 (1950).

A botanical description, an account of the procedure by which fat is extracted from seeds, and the use of the cocoa butter in chocolate-making are given.

Sesame oil. III. Antioxidant properties of sesamol.

BUDOWSKI, P. *J. Am. Oil Chem. Soc., 27,* 264-7 (1950).

Sesamol possesses marked antioxidant activity in lard and also exhibits a pronounced protection for vegetable oils, espe-

(Continued on page 10)

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Abstracts

(Continued from page 8)

cially for sesame oil. The antioxidant activity of sesamol strengthens the assumption that free sesamol is responsible for the unsual stability of hydrogenated sesame oil, a subject which has been reported in another article in this series. The use of sesamol as a commercial antioxidant would probably not be permitted until it has been shown to possess no undesirable physiological activity. However the presence of sesamol in concentrations up to 0.2% in sesame oil, one of the oldest edible oils known to man, would probably indicate that no serious adverse physiological problem exists in this respect. Although usually present in a bound form (sesamolin), this sesamol is known to be liberated by the action of mineral acids, even when quite diluted. Sesamol is a very low molecular weight compound which is sufficiently volatile to be removed by deodorization; consequently it should be added to the fat after deodorization.

FRUIT

Bitterness in Shamouti oranges. Part 3.

SAMISCH, Z., AND GANZ, D. *Canner, 110, 22,* June 24, 1950.

The occurrance of bitterness in different parts of the Shamouti orange was determined and the behavior of the bitter principle studied. A method was developed for the assaying of the intensity of bitter taste by dilution to threshold bitterness. The solvency of the bitter principle in various organic solvents was studied. The development of bitterness after the preparation of the juice or of the albedo suspensions was found to require a certain amount of time. If all solid particles were, however, removed from either of them immediately after preparation of the sample, bitterness failed to develop. Cold tended to retard and heat to hasten the development of bitterness. Bitter taste did not develop in basic media, but was intense in highly acid media. The concentration of the bitter principle was highest at the beginning of the picking season. In November, the segment walls were about 50 times as bitter as reamed juice and two to three times as bitter as the albedo. In the course of the season, the bitterness of all investigated fruit parts decreased rapidly, more so during November, but only gradually during December. Bitterness disappeared from the fruit early in January. During storage, fruit lost bitterness far more rapidly than if permitted to remain on the tree. Treatment of the fruit with ethylene did not accelerate loss of bitterness in reamed juice, but reduced it considerably in the albedo and the segment walls. The investigation suggests that the period of industrial orange juice production may be lengthened by storage of early picked fruit or by producing more closely filtered juice in the early season. The properties of the bitter principle in Shamouti fruit which have been investigated so far agree with those of limonin, but its identity has not as yet been definitely established. The bitter principle seems to be formed from a non-bitter precursor after its liberation from the cells.

PACKAGING

Starch and its application in machine coatings.

KERR, R. W. *Tappi, 33,* 268-71 (1950).

The physical chemistry of starch in relation to its use as the adhesive in high density coatings is discussed. It is proposed that minimum starch solubility and color viscosities and maximum adhesive strength result when the physical bonds holding starch molecules together are ruptured and when the dispersed molecules are reduced in size uniformly to a given minimum level. The mode of action of acid, enzyme, and oxidants in reducing the size of starch molecules, is compared. Weakening of the physical bonds in the granule superstructure follows as a secondary effect in these reactions, particularly in hydrolysis, from a reduction of the size of the molecules in the granular network. The action of aluminum chloride hexahydrate on starch in the dry state is to weaken granular structure, depolymerize the starch molecules to the level suitable for adhesive applications, and alter the ratio of linear to branched polymer molecules in starch. Application of this reaction system has led to the production of starch adhesives of low viscosity and high adhesive strength suitable for use in high density coating colors. Combination of the aluminum chloride reaction and enzymic conversion is described for the production of high density coatings suitable for machine application.

This wrapping absorbs odor.

Facts for Industr., 2, 10 AB 30 (1949); *Pack. Abst., 7,* 287, No. 1094 (1950).

A new packaging material claimed to prevent foods from losing aroma and also from becoming tainted with the odors of foods stored alongside them has been developed jointly by Sutcliffe, Speakman & Co. Ltd. (Leigh, Lancs), producers of activated carbon, and Cooke & Nuttall Ltd. (Bolton) papermakers. The carbon is dispersed in the pulp during manufacture, and the resultant paper has a light greyish tint. It is stated that no smell is perceptible even at the outer surface of a package containing an odorous substance. Although activated carbon is fairly expensive material, it is used in small proportions in the paper stock and the cost of the wrapping should therefore not be much higher than for untreated paper.

Coffee now marketed in Pliofilm laminated bags.

ROBINSON, E. S. & A., LTD. *Packaging Rev.,* p. 50 Feb., 1950; *Pack. Abst., 7,* 279, No. 1057 (1950).

As gas pressures are generated within the package, the ability of Pliofilm to control the pressure by allowing a certain amount of carbon dioxide to valve through is important in the packing of coffee. This slight relief of the pressure being built up within the package prevents it from bursting and at the same time prevents oxygen from entering the package. Freshly ground coffee can be held for 90 days wrapped in Pliofilm and still retain its original freshness.

PATENTS

COFFEE AND COCOA PRODUCTS

Flavor notes.

JACOBS, M. B. *Am. Perf., 55,* 389 (1950).

A description of Swiss Pat. 263,267 (Dec. 1, 1949), a process for preparation of an aromatized coffee extract or soluble coffee. Aroma is obtained as an alcoholic solution by extraction of coffee with ethanol; the ethanol solution is chilled to precipitate waxes. The dearomatized coffee is extracted with water, the water extract concentrated or dried, the defatted alcoholic-aroma solution added, and the mixture again dried if desired.

Aromatic plant extracts.

JACOBS, M. B. *Am. Perf., 55,* 387-9 (1950).

A description of Swiss Pat. 262,262 (Sept. 16, 1949), a process for producing dry, water-soluble, aromatized plant and vegetable extracts. The process, claimed to be applicable to flowers, fruits, seeds, beans (coffee is specifically mentioned), roots, peels, and leaves, comprises a distillation to prepare an aqueous aroma distillate, followed by water extraction of the plant material to obtain the water-soluble solids, evaporation of the extract, and re-incorporation of the aroma distillate. Sufficient lactose may be added to maintain the product in solid form.

Chocolate essence or extract.

MASUROVSKY, B. I. Assignor to Choco-Essence Inc. 2,512,663, June 27, 1950.

The method of producing chocolate extract which comprises extracting flavor and essence constituents of cocoa-bearing material while it is in its normal acid condition and while it still contains its original cocoa butter, with a heated aqueous solution of a compound from the class consisting of edible acids and their edible acid and alkaline salts, the extracting solution containing compound in amount insufficient to destroy the acidity of the cocoa-bearing material, and separating the chocolate extract solution substantially free of cocoa butter from the residue of acid cocoa-bearing material.

Method of preparing cocoa extracts.

PALMER, E. Assignor, by mesne assignments, to Moorehead Manufacturing Co., Inc. 2,515,794, July 18, 1950.

The method of making cocoa which comprises treating chocolate liquor with propylene glycol to liberate the cocoa butter contained therein.

(Continued on page 14 following technical papers)

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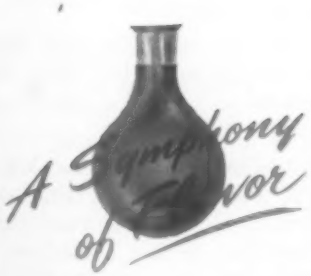

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Regional Section News

(Continued from page 6 preceding technical papers)

is an excellent means of acquainting our correspondents with food technology. By this means the user will improve the professional status of food technology.

"I would be very happy to have your comments on this matter."

Sounds like a splendid idea.

OREGON SECTION

The Section met at Consolidated Dairy Products Co. in Portland on November 3rd. The Dairy Cooperative Association acted as host and served a very enjoyable dairy lunch.

Mr. W. W. Henry spoke on a program to stabilize agricultural prices, known as the "Brandt Plan." [A side remark is in order. The Section Secretary's report of the meeting called it the "Brandt Plan," but he might have meant the "Brannan Plan." If there are a lot of Republicans around Corvallis, it is quite likely that they don't know that Charles F. Brannan is Secretary of Agriculture, and has a plan].

Professor E. H. Wiegand and Dr. Hoya Yang gave reports on the National Meeting in Chicago held last May.

WESTERN NEW YORK SECTION

The October meeting was held on the 23rd at the New York State Agricultural and Technical Institute at Morrisville. Arranged as a forum, in which the speakers presented short papers followed by a questionnaire period, the meeting aroused considerable interest. Speakers and topics were:

"Inhibition of Bacteria and Yeast Growth of Various Substances," Carl S. Pederson, N. Y. Agr. Expt. Sta., Geneva, N. Y.

"Quality Control Procedures and Food Plant Sanitation," Charles A. Stevenson, Curtice Bros. Co., Rochester, N. Y.

"Processing in Tin Containers," Arthur E. Guest, Continental Can Co., Syracuse, N. Y.

"Freezing Preservation of Food," Frank A. Lee, N. Y. Agr. Expt. Sta., Geneva, N. Y.

"Food Plant Equipment," Walter D. Pheteplace, Jr., The Pfaudler Co., Rochester, N. Y.

"Processing in Glass Containers," John P. Clark, Rochester, N. Y.

The November meeting was held at the New York Agricultural Experiment Station, Geneva, N. Y., and guests included a large number of food processors in this area. Considerable credit for the success of the meeting should be given to the staff of the New York Agricultural Experiment Station who sponsored and arranged the meeting. The following papers were given:

"Aims and Methods of Food Research," D. B. Hand, N. Y. Agr. Expt. Sta., Geneva, N. Y.

"What Pectins Mean to the Food Processor," Z. I. Kertesz, N. Y. Agr. Expt. Sta., Geneva, N. Y.

"Pilot Plant Studies on the Factors Influencing the Consistency of Tomato Juice," J. C. Moyer, N. Y. Agr. Expt. Sta., Geneva, N. Y.

"The Measurement and Control of Tomato Color," W. B. Robinson, N. Y. Agr. Expt. Sta., Geneva, N. Y.

"The Microbiology of Tomato Products," C. S. Pederson, N. Y. Agr. Expt. Sta., Geneva, N. Y.

"Processed Fruits Desired by Baker," W. H. Cathcart, The Great Atlantic and Pacific Tea Co., New York, N. Y.

"Determination of Maturity in Vegetables," F. A. Lee, N. Y. Agr. Expt. Sta., Geneva, N. Y.

"Relation of Quality of Frozen Vegetables to Number of Bacteria Present," G. J. Hucker, N. Y. Agr. Expt. Sta., Geneva, N. Y.

"Changes in the Starches and Proteins of Foods Due to Processing and Storage," P. E. Ramstad, Cornell Univ., Ithaca, N. Y.

"Developments in the Production and Utilization of Canned Foods," L. E. Clifcorn, Continental Can Co., Chicago, Ill.

PERSONNEL

SIMON W. ARENSON, formerly chief chemist for the Doughnut Corporation of America, Ellicot City, Maryland, has opened his own laboratory, "Food Development Laboratory" at 1403 Eutaw Place, Baltimore, Md. [This is a non-paid advertisement.]

Recent organization changes at Beech-Nut Packing Co., Canajoharie, N. Y. involve W. A. BRITTON who has been made Food Production Manager; E. J. ABELING, who has been transferred from San Jose, Calif. plant to Canajoharie to become head of the Food Laboratories of the Company there; and H. C. STRECKER who has been promoted to head of the laboratory at San Jose.

JAMES H. CUPPS has been appointed head of the newly-created pharmaceutical department of the amino products division of International Minerals and Chemical Corp., Chicago, makers of Ac'cent and other amino acids.

PHILIP P. GOTT, president of the National Confectioners Assn., has been appointed a member of a special trade association committee with the Department of Defense, Washington, D. C.

L. VERNE HASS, formerly general superintendent of the Eastern Division of Libby, McNeill and Libby has been elected vice-president in charge of the company's Hawaiian pineapple operation.

T. W. KEW, chemist at the Bureau of Agricultural and Industrial Chemistry's Citrus Products Station at Winter Haven, Florida, has been elected vice-president of the Florida Horticultural Society.

HENRI F. LOGCHER, director of the export department of Magnus, Mabee and Reynard Inc., New York, has left for Europe where he will make a survey of the western European essential oil situation.

ALAN C. RICHARDSON, Research Director, Vitamin Oil Division, California Packing Corp, Emeryville, Calif., and Mrs. Richardson recently returned from a three weeks stay in Honolulu. It was a business trip for Mr. Richardson, although some doubt has been expressed on this point among Northern California Section members of I. F. T.

DONALD K. TRESSLER, consultant and owner of Donald K. Tressler and Associates, Westport, Conn., has been appointed Technical Director of the Quartermaster Food and Container Institute for the Armed

(Continued on page 16)

"SANITARY STANDARDS FOR DAIRY EQUIPMENT" PUBLISHED

The "3A Sanitary Standards for Dairy Equipment" were compiled by the Committee on Sanitary Procedure of the International Association of Milk and Food Sanitarians. These drawings and specifications of sanitary design will be of interest to those charged with the design of food equipment, to sales engineers, dairy and food sanitarians and others. The standards represent the coordinated action of Committees of the U. S. Public Health Service, The Sanitary Standards Sub-Committee of the Dairy Industry Committee, and the International Association of Milk and Food Sanitarians.

The approved sanitary standards specifications and drawings for dairy equipment include the following: 1. Fittings Used on Milk and Milk Products Equipment; 2. Thermometer Fittings and Connections; 3. Storage Tanks; 4. Milk Pumps; 5. Weigh Cans and Receiving Tanks; 6. Homogenizers; 7. Automotive Transport Tanks; 8. Electric Motors and Motor Attachments; 9. Can-type Milk Strainers; 10. Filters Using Disposable Filter Media; and 11. Determining Holding Time of High Temperature Short Time Pasteurizers.

Copies of the standards may be obtained from the International Association of Milk and Food Sanitarians, George West, Secretary, Rochester Health Bureau, 44 Marshall Street, Rochester, N. Y., at $1.25 per set.

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Abstracts

(Continued from page 10 preceding technical papers)

FATS AND OILS

Antioxidant.

LUNDBERG, W. O. Assignor to Regents of the University of Minnesota, 2,523,127, Sept. 19, 1950.

A composition of matter comprising an animal fat, fat being stabilized by a phenolic antioxidant selected from the group consisting of tocopherols, hydroquinone and nordihydroguaiaretic acid and an amino acid selected from the group consisting of methionine, threonine, leucine, norvaline, phenylalanine, cysteine, tryptophane, isoleucine, proline, alanine, glutamic acid, valine, asparagin, arginine, norleucine, and mixtures thereof, the phenolic antioxidant and the total amino acid present each being in a concentration with the range of from 0.01% to 1.0% by weight, of the fat.

Preserved yeast products.

STERN, M. 2,523,483, Sept. 26, 1950.

As a new article of manufacture, a preserved yeast product comprising granulated live dried yeast, each granule of which is surrounded and enclosed by a coating of relatively stable fatty shortening.

Process for making pastry.

WILSON, L. H., AND WILSON, R. W. 2,522,591, Sept. 19, 1950.

A method of preparing a pastry product which comprises freezing a normally plastic shortening material at a temperature below 40° F. and thereby transforming it into a hard friable solid, grinding the frozen shortening material to dry, free-flowing particles, dry-mixing these frozen particles with flour and thereby thawing their surfaces sufficiently to cause the flour to adhere thereto in the form of a coating, and then moistening the flour-coated particles and rolling the resulting pastry mix.

Shortening.

JAEGER, E. B. 2,508,393, May 23, 1950.

A shortening for batters, doughs, and the like comprising a homogeneous mixture comprising from about 12 to 30% by weight of a monoester of an edible higher fatty acid chosen from the class consisting of glycerol monoesters and propylene glycol monoesters, an emulsifying agent other than monoesters from about 27 to 68% of water, and a fat, said shortening combination of the monoester and the fat being capable of being used in batter, dough and the like in an amount considerably less than the amount of fat alone that is ordinarily used.

FISH AND FISH PRODUCTS

Recovery of crab meat.

JOHNSON, R. M. Assignor to The Blue Channel Corp. 2,522,578, Sept. 19, 1950.

A method of recovering the body meat from crabs, which comprises making a circular cut through the ventral surface of the crab body and through the meat and skeletal parts within the body, the cut terminating substantially at the under surface of the carapace and defining a generally cylindrical core, rotating the core upon its axis, while it remains otherwise in place to disintegrate the viscera within the core at its end remote from ventral surface, removing the core from the remainder of the body, and rotating the core upon its axis to throw the meat therefrom by centrifugal action.

Method for the stabilization of soft roes of fish and product obtained thereby.

BERNARD, L. Assignor to M. A. E. Asada. 2,522,560, Sept. 19, 1950.

A granular, stable and preservable therapeutic product consisting of soft fish roe, dehydrated and defatted by repeated treatment with acetone and dried at low temperature under reduced pressure, product containing the active constituents and the hormone components of soft fish roe in unchanged condition.

FRUIT AND FRUIT JUICES

Apparatus for extracting juice from citrus fruits and the like.

QUIROZ, F. A. 2,522,800, Sept. 19, 1950.

An apparatus for extracting juice from fruit comprising a concave member and an opposed member having means mounting them for relative approaching and separating movement, concave member having projecting therefrom passage-bearing means adapted to pierce the skin at the adjacent side of a fruit pressed there-against upon relative approaching movement between two members, means for effecting relative approaching movement between two members to impale the interposed fruit upon passage-bearing means, and means for giving passage-bearing means retrograde movement relative to concave member during continued compression of the interposed fruit to thereby prevent passage-bearing means from piercing the skin on that side of the fruit that is engaged by opposed member. An apparatus for extracting juice from round fruit comprising means forming a variable concavo-convex internal chamber within which a fruit is subjected to compression and to substantial concavo-convex shape, means including a resilient annular compression sealing member closing the outer annular boundary of chamber, and means for passing juice from the interior of a fruit within chamber to the exterior of the latter.

Treatment of fruits and vegetables.

PRYOR, D. E. Assignor to Wallace & Tiernan Products Corp. 2,522,535, Sept. 19, 1950.

In the treatment of fresh fruits and vegetables, the improvement which comprises washing the surfaces thereof in an aqueous acid solution having its pH maintained in the range of about 4 to 6 and its chlorine concentration maintained in the range of about 25 to 250 p.p.m., the chlorine being present in the solution substantially in the form of hypochlorous acid.

GELATIN AND PECTIN

Gelatin dessert.

GRETTIE, D. P. Assignor to Swift & Company. 2,519,961, Aug. 22, 1950.

In a process of manufacturing a gelatin product having an improved rate of gelation in an acidic medium, the improvement which comprises: adding to a gel-forming material comprising gelatin extracted from a cured gelatin-containing material a water-soluble sulfate ion-producing composition in an amount between about 1 to 10% based on the dry weight of the gelatin; the sulfate ion substantially increasing the rate of gelation of a solution of the gelatin the presence of the acid.

Manufacture of glycol pectates and pectinates.

STEINER, A. B., AND MILLER, A. Assignors to Kelco Co. 2,522,970, Sept. 19, 1950.

The method of modifying the properties of a substance selected from the group consisting of the pectins, the pectinic acids and pectic acid and having at least one free carboxyl group which consists in esterifying substance with at least one equivalent of an alkylene oxide containing not more than eight carbon atoms and which is at least slightly soluble in water.

Isolation of pectinic acids.

OWENS, H. S., AND LOTZKAR, H. Assignors to the U. S. A. 2,522,534. Sept. 19, 1950.

A process of producing a low-methoxyl pectinic acid in solid stable form which comprises extruding an aqueous solution of a low-methoxyl pectinic acid in a thin stream into a bath of aqueous mineral acid maintained at a pH not exceeding about 2, whereby a thin, self-supporting film of precipitated low-methoxyl pectinic acid is formed, withdrawing film from the acid bath, washing it and then drying it.

MILK AND MILK PRODUCTS

Milk chocolate.

HALLQVIST, B. K., AND CAMPBELL, L. O. J. Assignors to Svenska Mjolkprodukter Aktiebolag. 2,519,833, Aug. 22, 1950.

The method of producing milk chocolate by mixing cocoa, fat, sugar and spray-dried milk which comprises utilizing as the lacteal component of the mix a spray-dried milk powder having an average grain porosity not exceeding approximately 10% by volume.

Casein manufacturing process.

SHARP, P. F. Assignor to Golden State Co., Ltd. 2,519,606, Aug. 22, 1950.

The method of recovering protein from defatted liquid milk, which comprises, simultaneously delivering into a mixing zone

a stream of milk, a stream of coagulant for casein and a stream of noncondensible gas inert to the material in mixing zone, intimately mixing milk with coagulant in mixing zone to form a mixture containing coagulated casein, and simultaneously dispersing gas as a disperse phase into the liquid material as a continuous phase in mixing zone during the formation of mixture to thereby produce a foam in which bubbles of gas having walls containing substantially uniformly coagulated casein are dispersed in whey, thereafter separating foam from whey by differences in specific gravity between foam and whey, spraying wash water upon the casein foam to purify the same, and then drying the casein to form a dried casein product.

PRESERVATION

Dehydration of food products.

BIRDSEYE, C. Assignor to Dehydration, Inc. 2,523,552, Sept. 26, 1950.

A process of producing dehydrated cooked potato in granular form capable of being rehydrated into mashed potato, which comprises the steps of first cutting raw potatoes into pieces and then continuously dancing the pieces above a movable surface to keep them from adhering together and to render the mass readily permeable by gaseous currents, and while thus dancing the pieces, subjecting them progressively to dehydration to about 75% of their initial content, to cooking of the partially dehydrated pieces, and to further dehydration of the cooked pieces to 20% to 65% of their initial moisture content, subsequently extruding the pieces while maintaining the starch cells substantially intact, and finally dehydrating the extruded product to approximately 4% of the initial content of the raw potatoes.

Process of drying food.

BORSOOK, H. Assignor of one-half to Aaron Sapiro. 2,510,543, June 6, 1950.

The process of dehydrating food characterized by: pretreating the food with a water solution of trichloracetic acid to destroy the enzyme and bacteria in food; then dehydrating the food until substantially free of acid.

Food preservation.

GROM, E. 2,509,299, May 30, 1950.

A process of preserving fresh and uncooked food which comprises submerging such food in a syrup composition including a bleach; during such submerging subjecting the composition to an elevated fluid pressure; and chilling the fresh and uncooked food while elevating the fluid pressure to which the food is subjected directly.

FUTURE DATES FOR FOOD TECHNOLOGISTS

1951

February 11. Annual Meeting, National Egg Products Association, Kansas City, Mo.

February 17-23. Annual Convention, National Canners Association, National Food Brokers Association, Canning Machinery and Supplies Association, Chicago, Ill.

February 27-March 2. National Frozen Food Industry Convention, San Francisco, Calif.

May. International Canning Conference, Paris.

June 9-15. International Food Exposition, Chicago, Ill.

June 17-20. **Eleventh Annual Meeting, Institute of Food Technologists, New York, N. Y.**

August 2-September 11. Eighth International Congress of Refrigeration, London.

September 26-29. International Association of Milk and Food Sanitarians, Glenwood Springs, Colo.

September. FAO Meeting on Herring Technology, Bergen, Norway.

(Information concerning future dates of national and international meetings, conventions and exhibits of interest to food technologists should be sent to the editorial offices.)

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Write to nearest regional secretary, if within an area covered by a regional section, or to the Executive Secretary of the Institute, for an application form and information regarding qualifications and classifications.

Regional Section News

(Continued from page 12)

Forces, Chicago. Dr. Tressler received his A.B. from Michigan in 1913 and his doctorate in agriculture and food chemistry from Cornell in 1918. He has had many fruitful years of experience in the food research field, and is the author or co-author of several books, technical and non-technical papers particularly in the preservation of foods by freezing. Dr. Tressler is moving from Westport, Conn., to Chicago.

M. K. VELDHUIS, in charge of the Bureau of Agricultural and Industrial Chemistry's Citrus Products Laboratory at Winter Haven, Florida, has recovered from an operation on his arm. It was a painful bursa. A bursa has nothing much in common with a bursar, who is the treasurer of a college.

KENNETH G. WECKEL, Professor, Dept. of Dairy and Food Industries, University of Wisconsin, has been elected president of the International Association of Milk and Food Sanitarians.

NECROLOGY

BYRON E. LESLEY, consultant in food technology with offices in San Francisco, died suddenly in July. He was 49 years old. Mr. Lesley had a wide experience in the food technology field. He had been connected with the California Packing Corp., California Conserving Co., Hunt Food and the Bridgeford Co. Just prior to going into his own business, Mr. Lesley was director of research and planning of Flotill Products, Inc., Stockton, Calif.

NELS H. ROSBERG, long active in the industrial refrigeration and food freezing industry, died suddenly of a heart attack on August 24th. Mr. Rosberg was a charter member and first president of the San Francisco Section of ASRE, as well as a charter member of the San Francisco Chapter of NAPRE. He was also a member of the I. F. T. and had published numerous articles relative to food processing. At the time of his death he was president of his own company: Nels H. Rosberg, Inc., Refrigeration Engineers, Consultants and Contractors. Mr. Rosberg is survived by his widow, Esther A. Rosberg, and one daughter, Phyllis Rosberg.

HORACE W. GRAY, chemist with the Harbauer Co., Toledo, Ohio, and a charter member of the Great Lakes Section of I. F. T. died suddenly on August 25th of a coronary occlusion.

PLANS FOR THE 1951 I. F. T. ANNUAL MEETING IN NEW YORK

Arrangements are now well along for the next national conference of the Institute of Food Technologists, the first to be held in New York City, which is set for Sunday to Wednesday, June 17 to 20, 1951, at the Hotel New Yorker. Co-chairmen of the general arrangements committee are S. L. Galvin of Huron Milling Co., New York, and J. H. Nair, Thomas J. Lipton, Inc., Hoboken, N. J. The co-chairmen and the local section officers were authorized by the New York

(Continued on page 18)

Book Review

CITRUS PRODUCTS—CHEMICAL COMPOSITION AND CHEMICAL TECHNOLOGY. By J. B. S. Braverman. Interscience Publishers, Inc., New York (1949), 438 pp., 105 illustrations and 35 tables. Price $9.00.

No previous publication has brought together such a wealth of information on the chemistry of citrus products, making it substantially a "must" for processors and laboratories interested directly or indirectly in fruit products. While presented in a manner which would permit its use as a text, it is primarily intended as a convenient working reference for industrial operators and research laboratories.

In presenting the chemical aspects of citrus products technology it is unsurpassed. This compilation of information on the chemistry of citrus products manufacture benefits from the broad travel of its author and brings American technologists an accurate report on procedures followed in the Mediterranean countries, as well as in other citrus producing areas.

The book is well bound and has a satisfactory number of well printed illustrations, tables and structural formulae. It contains an introduction discussing the history, botany, cultivation, marketing and diseases of citrus fruits.

Part I, entitled Chemical Composition, describes the chemical and physical characteristics of various portions of the fruit. Factors considered include pigments, oils, carbohydrates, pectic substances, enzymes and vitamins. Part II, entitled Chemical Technology, considers preparation of the fruit, extraction of essential oils, processing for a variety of juices and other products including citric acid and pectin. The Conclusion, entitled New Lines of Approach, considers several interesting possible future developments.

Appendices consider sanitation, waste disposal and specifications and standards for citrus products. There is a valuable author and subject index.

J. L. HEID.

TEXTBOOK OF BIOCHEMISTRY. By Phillip H. Mitchell. Second edition, 661 pp. + index. McGraw-Hill, New York (1950). Price $7.50.

For once an author has succeeded in revising his book without appreciably increasing its length. Data for the 1st and 2d edition are: pages, 600, 661; tables, 79, 85; figures 84, 90. The chapters remain the same. As nearly as can be judged without a rigid comparison, paragraph by paragraph, the book has really been revised, mostly by eliminating material of minor or of historic interest, and inserting research results of the past four years. Spot checks of a few recent discoveries that occurred to the reviewer, vitamin B_{12}, rutin, pteroylglutamic acid, microbiological assay of amino acids, revealed that they are in the new edition. According to the wrapper, most of the up-to-dating occurs in the sections on enzymes, intermediate products of metabolism, vitamins of the B group, hormones and antibiotics.

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This is a good text. The style is clear and readable, there are many cross references, there is a large amount of well-chosen tabular matter, and the figures are really informative.

Here again the term "biochemistry" is restricted in its meaning to animal, or more specifically human, chemistry, and plant chemistry gets the short end. Just one chapter, on photosynthesis, is devoted exclusively to plants, while nine chapters are exclusively animal and the rest are about 90 percent animal. The viewpoint of the author is that of human physiology, as is indicated by the following quotes from the preface: "This book will be found to place emphasis upon nutrition. Correct nutrition is part of the basis of human welfare." "While it may seem logical to the student mind to approach biochemistry from the anatomic point of view, treating each organ system of the body in its turn, there are also advantages in viewing the material from the standpoint of systematic organic chemistry or from that of physiological function."

The food technologist will find in this book no working directions for the practice of his trade. If, however, he wants to refresh his information on the basic chemistry of proteins, carbohydrates, fats, and enzymes, and if he wants an understanding of nutritional quality in foods, he can do well to look into this book.

J. J. WILLAMAN.

PLANS FOR THE 1951 I. F. T. ANNUAL MEETING IN NEW YORK

(Continued from page 16)

Section, official hosts, at a meeting on October 18, to form a membership corporation to facilitate the execution of contracts covering housing, banquets, meetings facilities, printing and the industrial exhibit.

With the backing of the national executive, the local committee is planning to capitalize on the New York meeting as an exceptional opportunity to gain public recognition for the contribution of the food technologist to the problem of everyday living. Highlights of the program will be the presentation of the three established food technology awards, the Appert Medal, the Babcock Medal and the Food Industries Award.

At least part of the program will have interest for the general press, and special features are contemplated for the radio and television services. In addition, the aid of all members appearing on the program will be sought in the preparation of special press releases, distinct from the usual abstracts for the printed program.

Invitations to commercial exhibitors have been sent out by R. C. Sherwood, Sterwin Chemical, Inc., New York, chairman of the Exhibit Committee. Unofficial reservations and formal contracts received indicate that booth space will be sold out promptly. The exhibits will have much of scientific and technical value for the membership at large, and convenient times will be arranged in the program schedule for viewing the exhibits and talking with informed representatives of the companies displaying their products and services.

Recognizing that many of the visitors will want to enjoy some of the general advantages of New York as a convention center, the local committee will make provision for time away from headquarters for professional visiting, avocational pursuits or pleasure trips. There will be a definite schedule of plant visits from which the technologist may choose, since there are in and about New York more food processing operations and laboratories than is ordinarily realized by the non-New Yorker.

Research papers for the technical sessions are being called for this year as last year, and symposia on topics of current interest are being set up by the program committee under Chairman C. N. Frey, Standard Brands, Inc., New York.

Note to Authors:

Please send the titles and abstracts of your papers before March 1, 1951, and the finished papers before May 1st, 1951, to the Program Chairman. Symposium papers should be limited to 20 minutes each, with 5 minutes for discussion. Non-symposium papers should be limited to 12 minutes each, with 3 minutes for discussion.

When submitting your abstract, write the Program Chairman stating the time required for your paper, whether or not you will have slides or films, the type of projector needed, and other details necessary to make the presentation of your paper as effective as possible.

Any groups wishing to have private meeting facilities should submit details to S. L. Galvin, co-Chairman of the General Arrangements Committee, as early as possible.

EMPLOYMENT NOTICES

Position wanted by Food Engineer, M.S. in Chemical Engineering & Biochemistry, and some work towards Ph.D., 27 years old, single, 1½ years experience in food storage cabinet design, interested in any food operation. Reply Box 129, Institute of Food Technologists, 176 W. Adams St., Chicago 3, Ill.

Wanted, Food Technologist, quality control and food analysis experience. Give training, experience, references, salary and photo. Large Midwest manufacturers of macaroni products, salad dressing items, preserves, peanut butter, extracts, gelatin desserts, etc. Reply Box 128, Institute of Food Technologists, 176 W. Adams St., Chicago 3, Illinois.

Wanted, position in production by Food Technologist. 12 years varied work in production, product development, quality control, and inspection, including canned specialties, bakers' supplies. Excellent technical background. Reply Box 130, Institute of Food Technologists, 176 W. Adams St., Chicago 3, Ill.

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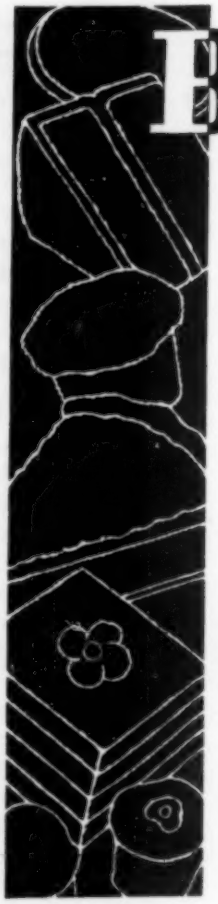

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Book Review

METHODS IN FOOD ANALYSIS APPLIED TO PLANT PRODUCTS. By Maynard A. Joslyn, Academic Press, New York (1950). 525 pp. Price $8.50.

Here is a text book in food analysis that covers a broad field in an admirably capable manner. The author leads with a discussion of Statistical Analysis, errors, expressions of results, and sampling. Physical methods of food analysis, such as moisture determinations, ashing, densitometry, refractometry, colorimetry, and polarimetry are then discussed. The latter half of the book is devoted to principles involved in the most frequently encountered chemical determinations. Available methods for each of the chosen constituents are discussed, and at least one method is described in detail. At the end of each chapter an exceptionally complete list of references to the basic research on each topic is presented. This feature will prove especially valuable to those involved in research and quality control.

There are few books covering the practical and fundamental aspects of food analysis in the manner that they are presented here. Perhaps Triebold's "Quantitative Analysis with Application to Agricultural and Food Products," (D. Van Nostrand, New York, 1946) is the most nearly comparable of the recent books. Dr. Joslyn gives most attention to fruit and vegetable analysis, while the former author divides his attention more evenly over the whole food field.

Although the author intended this book primarily for a text, it will be extremely valuable to anyone concerned with food research or analysis. Since it often will be used for a quick review on a forgotten or dimly remembered subject, the book is not likely to collect dust in any active laboratory.

In this reviewer's opinion the author is to be especially commended for his chapters on the importance of statistical analysis and sampling. Far too much work is reported in our scientific periodicals by workers who have not been sufficiently trained in proper sampling procedures, and cannot evaluate data after they have it. These fundamentals are extremely important in all fields of biological science.

Probably the book should not be criticized for lack of completeness, since the author makes no claim in this respect. If the reader desires more information, the necessary references are supplied. However, a rebalancing of the colorimetry section might be desirable in later editions. For example, five pages are devoted to the Lovibond tintometer and Duboscq colorimeter, both of which are seldom seen in a modern analytical laboratory. If more space in future editions were devoted to the modern methods of colorimetry, especially tristimulus colorimetry, it would be of greater practical value.

The book helps to emphasize recent trends in food analysis. The author has shifted the emphasis of the older texts from detection of adulterants, spoilage, and preservatives, to such topics as the accurate, reproducible, objective procedures for the evaluation of quality in foods. This is a compliment to modern food technology.

WILLARD B. ROBINSON.

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Authors of papers intended for publication in FOOD TECHNOLOGY should request from the editorial office a copy of the booklet, entitled "Suggestions to Authors." Manuscripts submitted for publication in FOOD TECHNOLOGY should follow the style described in this booklet.

The Institute of Food Technologists assumes no responsibility for statements in contributed articles appearing in FOOD TECHNOLOGY. Editorials present only opinions of the writers and do not necessarily reflect policies of the Institute of Food Technologists.

Regional Section News

CHICAGO SECTION

The officers of the Chicago Section elected for the calendar year 1951 are as follows:

Chairman: Berton S. Clark, American Can Company.

Vice Chairman: V. O. Wodicka, Libby, McNeill and Libby.

Secretary: Dorothy A. Huber, Q. M. Food and Container Institute.

Treasurer: G. E. Brissey, Swift and Co.

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Section Councilors: L. B. Howard, University of Illinois; W. J. Shannon, Oscar Mayer and Co.; B. S. Clark, Lloyd A. Hall, Griffith Laboratories, and V. O. Wodicka.

NORTHERN CALIFORNIA SECTION

The December meeting was held on the 9th at the Western Regional Research Laboratory of the Bureau of Agricultural and Industrial Chemistry, Albany, California. The morning and afternoon sessions consisted of the following papers:

"An Experimental Falling Film Evaporator for the Preparation of Juice and Puree Concentrates at Low Temperatures." L. H. Walker and D. C. Patterson, Western Regional Research Laboratory.

"Application of Steam Injection Heating to Food Processing." A. H. Brown, M. E. Lazar, T. Waserman and W. D. Ramage. Western Regional Research Laboratory.

"Direct Isolation of *E. coli.*" R. H. Vaughn, University of California and R. Whitmore, National Canners Association.

"Problems in the use of Antibiotics in Food Preservation." H. S. Olcott, Western Regional Research Laboratory.

"Testing Baking Qualities of Dried Milk." C. A. Kempf, Golden State Co., Ltd.

"Prune Harvesting Studies." J. H. Kilbuck, University of California.

"Glass Containers." R. L. Chaney, Glass Containers Manufacturers Institute.

"Glass Containers Closures." Glass Containers Institute.

"Tin Can Materials." American Can Co.

"Tin Can Usage and Handling." Continental Can Co.

"Paper Containers in the Food Industry," D. G. Edwards, Fibreboard Products Co.

"Color Estimation of Frozen Strawberries." Oliver J. Worthington and J. M. Shah, Oregon State College.

"Method for the Estimation of Residues of Parathion." B. L. Hatherell, John Doble and C. H. Andrus, California Packing Corp.

"A Colorimetric Method for the Determination of Methoxychlor." John Doble and Wayne Thronburg, California Packing Corp.

"Application of Froth Flotation." F. P. Griffith, Western Regional Research Laboratory.

"The Inside Story of Cake Baking." A movie furnished through the courtesy of Swift and Co.

The above was a pretty full meeting (although members were warned to do their drinking elsewhere), and was followed by the evening dinner meeting at 6:30 at the Women's City Club in Berkeley. At this meeting our president (Paul, that is, and not Harry) gave an interesting and informative talk on "Long Time Trends in the Production of Food."

NORTHEAST SECTION

The Section met on December 7 at Patten's Restaurant in Boston. At 6:00 P.M. cocktails were served on a cash-and-carry basis in the meeting room. Following the dinner, the program was presented by a group of staff members of the Department of Food Technology, University of Massachusetts. The papers:

"Sudies in Food Packaging." A. S. Levine.

"Pre-peeled Potatoes." E. E. Anderson.

"Processing Fresh Packed Pickles." W. B. Esselen.

"Thermal Inactivation of Enzymes in Acid Foods." E. Nebesky.

"Heat Transfer in Glass Containers." I. S. Fagerson. (Illustrated with a movie showing convection currents in glass containers during heat processing).

The Institute has accepted the Northeast Section's invitation to hold the 1953 Annual Meeting in Boston from June 22 through June 26. Members of the Institute will well remember the last annual meeting in Boston when we were supposed to have sailed to Gloucester by boat and the skipper refused to take his ship out because of choppy conditions, and Berny Proctor rose to the heights of logistic splendor and chartered a special train in almost a wink of an eye to take the whole gang to Gloucester where we had a wonderful clam bake at Cape Ann, and everything went off according to plan after all.

PUGET SOUND SECTION

The section met on November 27th at Sick's Century Brewery in the Tap Room. A most sumptuous dinner was served after which Dr. A. K. Balls of the Bureau of Agricultural and Industrial Chemistry's Western Regional Research Laboratory talked on "Enzymes in Foods." Dr. Balls' address was of such interest that questions and discussions continued for more than an hour.

Dr. Balls, accompanied by T. L. Swenson and James C. Palmer, proceeded to Vancouver, B. C., to attend a meeting of the Vancouver Food Technologists group where Dr. Balls repeated his address before about 75 enthusiastic members on the evening of November 30th.

New officers of the Puget Sound Section have been announced as follows:

Chairman: James C. Palmer, Food and Drug Administration, Seattle.

Chairman-elect: John A. Ardussi, Carl F. Miller Co., Seattle.

Secretary: F. Bruce Sanford, U. S. Fish and Wildlife Service, Seattle.

Treasurer: Joseph L. Bigas, American Can Co., Seattle.

National Councillor: Charles R. Stumbo, Washington State College, Pullman.

Executive Committee: Clarence W. Hurlbut, Blue Banner Foods, Kent; Francis P. Owes, Laucks Laboratories, Inc., Seattle; Ray W. Clough, National Canners Assn., Seattle; Max Patashnik, Libby, McNeil and Libby, Seattle.

Program Chairman: John A. Ardussi, Carl F. Miller Co., Seattle.

(Continued on page 10)

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Selected Abstracts

BIOLOGICAL SCIENCES

BIOCHEMISTRY

Studies on carotenoid metabolism. X. The site of conversion of carotene to vitamin A in the chick.

CHENG, A. L. S., AND DEUEL, JR., H. J. *J. Nutr., 41,* 619-27 (1950).

Data are interpreted as proof that the chick is able to change B-carotene to vitamin A in the intestinal wall.

The effect of fluoride and grapefruit juice on the etching of teeth.

SPENCER, JR., A. J., AND ELLIS, L. N. *J. Nutr., 42,* 107-15 (1950).

The lower molars of young male rats were found to be strongly etched after the animals drank commercially canned grapefruit juice as the sole beverage during an 11 week period. The erosion was due to the acidity and not to the sugar content or any other factors, since no erosive action was found when sucrose-water or neutralized grapefruit juice became the fluid intake. There was about 60% protection when 50 p.p.m. of the fluoride, as sodium fluoride, were added to the grapefruit juice.

The influence of glutamic acid on test performance.

ELLSON, D. G., FULLER, P. R., AND URMSTON, R. *Science, 112,* 248-50 (1950).

The effect of 30 g. per day of sodium glutamate on the test performance of 30 retarded children was studied with careful controls. Results indicate the effect is slight and that previous investigators who found striking improvements failed to use proper controls.

Liver damage produced by feeding alcohol or sugar and its prevention by choline.

BEST, C. H. et al. *Brit. Med. J.,* 1001-06 (1949); *Am. J. Dig. Dis., 17,* 250 (1950).

Supplementing 15% alcohol or isocaloric amounts of sugar solution for drinking water of white rats resulted in fatty changes or fibrosis of the liver. This is thought to be due to imbalance of caloric intake and vitamin supply. The alcohol or sugar supplants choline-containing foods. Protection is given to the liver by use of adequate amounts of choline or its precursor methionine. Application to man not known.

Distribution of radioactive cobalt in the rat.

CUTHBERTSON, W. F. J., FREE, A. A., AND THORNTON, D. M. *Brit. J. Nutr., 4,* 42-8 (1950).

The metabolism of dietary ^{60}Co was studied in the rat. The amounts used were of the order met in normal or cobalt-low diets, i.e. about 0.01-0.06 p.p.m. cobalt. Over this range, the retention during the first 14 days on the diet was 5 to 7% of the total intake. The highest concentrations of labelled cobalt were found in the liver, kidneys, spleen and pancreas.

BOTANY

Use of growth-inhibiting substances in storage of ware potatoes. I. Experiments during the storage season 1948-49.

EMILSSON, B., LILLIEROTH, C. G., AND NILSSON, R. *Kgl. Lantbruksakad. Tidskr., 88,* 487-506 (1949); *Nutr., Abst. Rev., 19,* 820, No. 4542 (1950).

Literature on compounds which inhibit the sprouting of potatoes is reviewed. The three compounds tested were Fusarex, 3% tetrachloronitrobenzene; Germex, 1.5% α-naphthalene acetic acid methyl ester and Regulex, 1% of the same compound. These were used in the amounts recommended by the manufacturers and in amounts three or four times as great. Three tests were made in stores and one in clamps. The results are tabulated, with headings in English, showing losses due to sprouts and to rotting, other loss of weight, and total loss in storage. In the untreated potatoes in cellars, total weight loss was between 14 and 19% between November and May, or July, or April; in clamps it was 9.6% between November and May. Loss of starch was 12 to 13%. Fusarex gave the best results. It inhibited sprouting whether applied at time of storage or in the spring; it also reduced rotting, on which the other compounds had no effect. Weight loss was reduced to about 5 to 9% in stores and 6.7 in clamps. There was no significant effect on flavor after boiling, but there was some darkening of color and increased tendency to boil down.

Changes in composition of cottonseed during development and ripening.

GRINDLEY, D. N. *J. Sci. Food Agric., 1,* 147-51 (1950).

No appreciable oil develops in the seed until about the 35th day, when it increases rapidly; the carbohydrates decrease over this period. The oil as first formed is highly acidic, and contains much unsaponifiable matter, although the composition of the fatty acids remains practically constant over this period. The protein and ash contents increase steadily more or less in proportion to the weight of seed, but the crude fibre shows a sharp increase shortly before full maturity is reached. The immature seeds yield oil which does not respond to the Halphen test.

NUTRITION

On the relative nutritional efficiency of sucrose and glucose in the albino rat.

LAMB, A. R. *J. Nutr., 41,* 545-53 (1950).

Two feeding experiments are reported in which sucrose and glucose were fed to rats at a level of 67% of a complete ration. Analysis of the carcasses indicated that the body storage in calories per calorie of food ingested showed a slight difference in favor of the sucrose ration.

Anti-peptic ulcer dietary factor. (Vitamin U) in the treatment of peptic ulcer.

CHENEY, G. *J. Am. Diet. Assn., 26,* 668-72 (1950).

The results of raw vegetable therapy of guinea pigs with histamine-induced peptic ulcers indicates that there is an anti-peptic ulcer dietary factor which is readily destroyed by heat. Cabbage in the form of the head, leaf, or juice is a source of this factor. It is also in many green vegetables, milk, butter, egg yolk. The anti-peptic ulcer factor in cabbage apparently varies in its concentration with the variety of the cabbage, the season, the method of transportation, and the age of the vegetable after it is harvested.

Observations on an unknown dietary factor essential for human growth.

SYNDERMAN, S. E. et al. *J. Nutr., 42,* 31-44 (1950).

A deficiency syndrome which occurs after prolonged feeding of a purified ration in which all the vitamins are supplied as synthetic supplements is described, for human infants. The syndrome consists of a cessation of weight gain unaccompanied by any other symptoms or signs. This factor may be identical with vitamin B_{12} or the animal growth factor. The diet report in this paper does not prove this as yet.

Fluoride studies related to the human diet.

HAM, M. P., AND SMITH, M. D. *Canadian J. Res., 28F,* 227-33 (1950).

Analyses of whole meals and beverages indicated that the amount of fluoride normally present in the adult diet in quite low, but the ingestion of tea or high fluoride waters greatly increases it. The fluoride content of cow's milk from low and high water-fluoride areas was determined. Analyses of some

(Continued on page 11)

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Regional Section News

(Continued from page 6)

Publicity Chairman: T. L. Swenson, Food Chemistry and Research Laboratory, Seattle.

Membership Committee Chairman: Max Patashnik, Libby, McNeil and Libby.

Employment Committee Chairman: L. P. Callahan, Libby, McNeil and Libby.

INDIANA FOOD TECHNOLOGISTS ASSOCIATION FORMED

In August, 18 representatives from 11 of Indiana's major food, pharmaceutical and agricultural processing industries, laboratories and educational institutions met in Indianapolis to form the "Indiana Association of Food Technologists." Officers elected were: chairman, L. F. Rutledge, Stokely Foods, Inc.; vice chairman, Kevin G. Shea, Kingan and Co.; and secretary-treasurer, George H. F. Schnakenberg, Eli Lilly and Co. The association will ultimately apply for acceptance as a regional section of the I. F. T. There are to be five meetings a year with programs including entertainment and scientific presentations of pertinent interest.

PERSONNEL

Paul B. Christensen, vice president and chief engineer of Merchants Refrigerating Co., New York City, took office as president of the American Society of Refrigeration Engineers on December 6th. Mr. Christensen is a graduate of Stevens Institute of Technology and has been connected in the past with Kroger Grocery and Baking Co., and Cincinnati Union Terminal Co. He has been chairman of the Research and Marketing Cold Storage Advisory Committee of the U. S. Department of Agriculture, and an advisor on refrigerated warehouses to the Brazilian government.

Maynard A. Joslyn of the Food Technology Division, University of California at Berkeley is still recuperating from his operation of October 10th. He is at his office for a few hours each day, but will return to the hospital for further surgery. This will interfere with his planned sabbatical leave to Israel.

N. T. Joyner, formerly manager of the Administrative Division, Research Department, Lever Brothers Co., Cambridge, Mass., has been promoted to assistant director of research for the company. His headquarters will be in Cambridge.

Gordon MacKinney, professor of food technology at the University of California, Berkeley, has been appointed to serve as a member of the advisory board of *Analytical Chemistry*.

Ralph L. Miller of Plymouth Citrus Growers Assn., Plymouth, Florida, was re-elected president of the Florida Citrus Processors Assn. at the Association's meeting at West Palm Beach in October. He was also elected treasurer of the Florida Canners Assn.

R. Henry Morris, 3rd, of the Bureau of Agricultural and Industrial Chemistry's Eastern Regional Research Laboratory, and a member of the Philadelphia Section of I. F. T., was one of the members of a team receiving USDA's Distinguished Service Award from Knox T. Hutchinson, Assistant Secretary of Agriculture, on October 27th. The award was granted for developing the first successful process for recovering the volatile flavors of fruit juices in concentrated form. Other members of the team, all from the Eastern Regional Research Laboratory were R. K. Eskew, G. W. M. Phillips, E. L. Griffin, Jr., R. P. Homiller, N. H. Eisenhardt and Howard Milleville, the last named being a member of the Chicago Section of I. F. T. and now connected with the news magazine: "Food Processing."

Robert A. Nanz, formerly director of the food and nutrition section of Foster D. Snell, Inc., New York City, has joined Florida Citrus Canners Cooperative at Lake Wales, Florida. He will work on new product development and research on flavor and nutritional by-products.

Clarence Sterling, of Los Angeles has been appointed to the Food Technology staff of the University of California at Berkeley. Dr. Sterling received his doctorate from the University of California where he was a member of the teaching and research staff in botany and forestry. He also taught at the University of Wisconsin and the University of Illinois.

Leonora H. Strohmaier (nee Hohl), formerly lecturer in Food Technology and assistant mycologist at the University of California, Berkeley, has resigned to devote her time to her husband, her home and to being a mother.

Your 1951 I.F.T. Dues

Statements for 1951 dues were mailed to all members in November. Have you overlooked yours?

If dues are not paid on or before March 1st the Constitution requires that the membership be suspended and subscription to the Journal terminated.

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Abstracts

(Continued from page 8)

baby foods showed that the fluoride content of certain cereals containing bonemeal is high. The influence on the infant diet of these cereals and of water and milk is illustrated.

FOOD PRODUCTS

BAKING AND BAKERY PRODUCTS

Determination of chlorides in bread.

DANGOUMAU, A. *Bull. Soc. Chim. Fr., 16,* 788-9 (1949); *Brit. Abst.*, C, 241, No. 1959 (1950).

The natural ash content of bread is corrected for added salt by deducting the chlorides as NaCl percent in the total ash percent from the latter. The correction for loss on incineration is made on the basis of Delarouzee's statement (cf. *Ann. Falsif., 174,* 472 (1948), that only Cl is lost, the Na remaining bound by the P_2O_5; this is correct for practical purposes. The difference between the total chloride in the bread and that in the ash (both calculated as NaCl percent in the bread) gives the loss of Cl on incineration; the weight-percent of Na corresponding to the lost Cl is calculated and deducted as a second correction from the value obtained as above, the result representing the natural ash content of the bread.

Results so far obtained in high frequency baking.

BROEKHUIZEN, S., AND SCHUILENBURG, A. *Bakkerij-Wetenschap, 2,* 93-102 (1949); *Biol. Abst. 24,* 1712, No. 17842 (1950).

High frequency heating applied to baking bread was investigated in 1949 by the Cereals Department of the Central Institute for Nutrition Research (Wageningen). Although the first experiments were not satisfactory and showed typical burning faults, further investigations showed that the high frequency baking of bread is quite practicable. Good results were obtained, when open baking tins of mycalex—first used in the experiments—were replaced by wooden containers, closed at the sides by means of plates of asbestos cement covered with a terrazzo-like finish (so-called: eternitemaille). Moreover, the advantage of using these containers was that they caused a certain amount of dielectic loss in the material, resulting in a supplemental heating effect upon the surface of the dough. In this way a dry thin skin was formed on the loaf. It was calculated that the high frequency heating comes to 0.025 per loaf. Using a high frequency generator with an output of 40 kw., it would be possible to bake 340 loaves of 0.8 kg. (nearly 200 kg. of flour) every hour. Further investigations on a scale nearer to commercial practice was considered to be desirable.

CEREALS AND GRAINS

Composition of the component parts of the sorghum kernel.

HUBBARD, J. E., HALL, H. H., AND EARLE, F. R. *Cereal Chem., 27,* 415-20 (1950).

Grain from five varieties of sorghum was separated into endosperm, germ, and bran, and the proportion of each was determined. The kernel contains about 82% endosperm, 10% germ, and 8% bran. All fractions and the whole grain of each variety were analyzed for ash, protein, oil, and starch.

The quality of hard red winter wheat as affected by 2, 4-D spray applications.

SHELLENBERGER, J. A. et al. *Cereal Chem., 27,* 162-6 (1950).

Samples of hard red winter wheat grown in 1948 at the Fort Hays (Kansas) Branch Experiment Station and representing various dates, types, and dosages of 2, 4-D application revealed no reduction in wheat yield resulting from treatment with 2, 4-D. Only one date of application of 2, 4-D in four produced a significant increase in wheat protein. When yield of protein (percent protein yield) was considered, there was no difference between treated and untreated samples. Applications of 2, 4-D did not affect the mineral content, milling, or baking quality of the wheats. These conclusions were based on one year's samples, obtained from one location.

(Continued on page 14)

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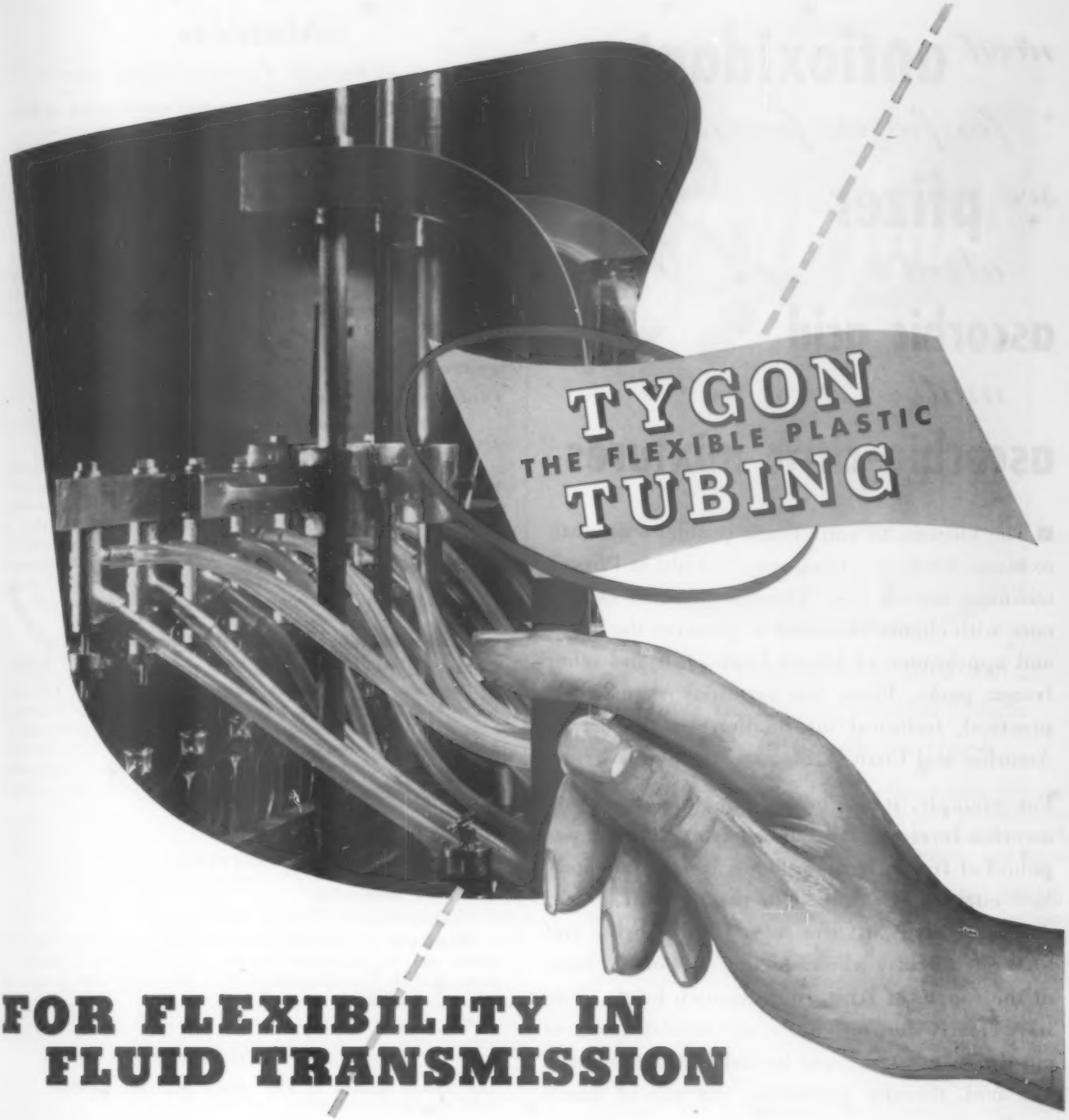

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Abstracts

(Continued from page 11 preceding technical papers)

Studies of the effects of polyoxyethylene monostearate on flour amylase activity.

MARNETT, L. F., AND SELMAN, R. W. *Cereal Chem., 27,* 349-57 (1950).

Polyoxyethylene monostearate increases amylograph maximum paste viscosity of wheat flour pastes to a varying degree, dependent upon the amount of ester added and the α-amylase content of the flour. A significant increase in maximum viscosity is produced by polyoxyethylene monostearate in the absence of α-amylase. The effect is likewise manifested when the agent is added to pastes made from corn starch and waxy maize.

EGG PRODUCTS

Fumigation of shell eggs with ethylene oxide.

LORENZ, F. W., STARR, P. B., AND BOUTHILET, R. *Poultry Sci., 29,* 545-7 (1950).

Ethylene oxide gas employed as a fumigant has been found to be capable of affording almost complete protection to previously infected eggs during a period and under storage conditions in which similarly infected unfumigated eggs develop a high percentage of spoilage. The treatment is efficacious if employed wthin at least 4 days after infection, but extreme limitations of the treatment remain to be worked out, as do practical applications to eggs infected under field conditions.

Dried albumen: removal of sugar by yeast before drying.

HAWTHORNE, J. R. *J. Sci. Food Agric., 1,* 199-201 (1950).

Procedure for preparing stable dried albumen. The egg white, before drying, is freed from the naturally occurring glucose by yeast fermentation and from yeast by centrifuging. Laboratory tests showed little or no difference between the best experimental samples and samples of commercial, bacterially fermented albumen. This result was confirmed by tests carried out under commercial bakery conditions.

FEEDSTUFFS

Feed grade methionine.

Soybean Dig., 10, 17, Oct., 1950.

Methionine is now available, feed grade, at a price that will enable feed manufacturers to use it in fortifying soybean oil meal. For all vegetable rations, 97% DL-methionine is used at the rate of 1-2 lbs. per ton of feed.

FLAVORS

The methyl ketones of blue cheese and their relation to its flavor.

PATTON, S. *J. Dairy Sci., 33,* 680-4 (1950).

By means of a steam distillation and ether extraction procedure, it has been possible to recover material from blue cheese containing a high concentration of methyl ketones. By fractional distillation of this material, relatively pure fractions of pentanone-2, heptanone-2 and nonanone-2 were obtained. Acetone was identified as a constituent of the ether-extended steam distillate from blue cheese. These methyl ketones would appear to be formed from the fatty acids in the cheese by beta-oxidation. Similarity in odor between these ketones, particularly heptanone-2 and that of blue cheese was noted by a number of observers during the course of this investigation. It seems probable that minute quantities of these methyl ketones are the constituents which make the flavor of mold-ripened cheeses distinctly different from the flavor of other types of cheese.

Chicken flavor: separation and concentration of its volatile components from broth.

BOUTHILET, R. J. *Food Res., 15,* 322-5 (1950).

The flavor of chicken consists of volatile compounds which are sufficiently stable to be stripped from a broth and concen-

Abstracts

trated in a fractionating column. These volatile compounds can be used in a synthetic "basal" to produce a broth indistinguishable by sensory perceptions from natural chicken broth. The concentrate can be used to determine chemical properties of the flavor.

Vanilla fruit.

Perf. Essen. Oil Record, 41, 267 (1950).

The Mexican vanilla bean industry has developed a new product: "Vanilla Fruit." Ripened beans are ground to a fineness suitable for percolation; the conventional method uses whole beans. The curing process (sweating and drying) is carried out as before, except that the ground product requires only 60 hours compared with 70 days for whole beans. After curing, the ground product is artificially dried; the former process called for sun-drying. Advantages claimed for the new process; (1) no grinding necessary before percolation to make extract, therefore no flavor change or loss; 2) known, constant moisture content; 3) no insects, molds, or yeasts.

Spearmint flavor from orange peels.

BORDENCA, C., ALLISON, R. K., AND DIRSTINE, P. H. *Science N. L., 58,* 184 (1950).

Carvone, a chemical present to the extent of 65% in natural spearmint oil, has been synthesized from the peels of oranges and grapefruits at the Southern Research Institute in Birmingham, Alabama.

MEAT, FISH AND SEAFOOD

Nutritive values of sausage and other table-ready meats as affected by processing.

BEUK, J. F., FRIED, J. F., AND RICE, E. E. *Food Res., 15,* 302-07 (1950).

The thiamine, riboflavin, and niacin contents of 15 different types of sausage or table-ready meats have been determined and compared to corresponding values for the raw products from which they have been made. No consistent loss of riboflavin or niacin was observed,, most variations being well within the range of experimental variation. Slight losses of thiamine (2 to 26%) occurred in manufacture of these products.

Storage temperature and the control of red bacteria on fish.

CASTELL, C. H. Fish Res. Bd., Canada Atlantic, No. 50, 13-15, July, 1950.

Red halophilic bacteria grow very rapidly at temperatures between 90° and 100° F., and even faster at 110°-115° F. At 70°-80° F. red bacteria grow more slowly, but may ultimately discolor fish. Temperatures between 40°-50° F. seem to prevent growth of organisms on lightly contaminated fish.

Effect of several antibiotics and food preservatives in retarding bacterial spoilage of fish.

TARR, H. L. A., SOUTHCOTT, B. A., AND BISSETT, H. M. Fish Res. Bd. Canada, Pacific, No. 83, 35-8, July, 1950.

With halibut, red spring salmon and sole, dehydroacetic acid (Na salt) exerted mild bacteriostatic action. Sodium nitrite strongly retarded bacterial action. Monobromoacetic acid ester (sopura) exerted strong bacteriostatic action with halibut but not with salmon. Subtilin was valueless, and penicillin and streptomycin had weak preservative action. Aureomycin and terramycin were effective. Further studies will be made on effects of temperature and acidity.

SALT

Some effects of salt and moisture on rancidity in fats.

CHANG, I., AND WATTS, B. M. *Food Research, 15,* 313-21 (1950).

Dry sodium chloride and sodium chloride solutions at high concentrations behaved as prooxidants in fat oxidation. Calcium chloride had a much greater accelerating effect than

(Continued on page 16)

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Abstracts

(Continued from page 15)

sodium chloride. Potassium chloride had very little effect. Partial or complete dehydration of salt solutions in contact with fat greatly accelerated rancidity. Sodium chloride did not specifically affect the activity of solutions containing unsaturated fat oxidase (hemoglobin and muscle extract). Possible explanations for the accelerated rancidity in frozen or cured meats by sodium chloride are discussed.

The destruction of red halophilic bacteria in solar salt.

CASTELL, C. H. Fish. Red. Bd., Canada, Atlantic, No. 50, 9-12, July, 1950.

Freezing and heating methods to try to rid solar salt of the red salt tolerant bacteria. Freezing did not reduce number or activity of red organisms. Moist heat was more destructive than dry heat; red bacteria that withstood 7 minutes dry heat at 216° F. were unable to survive 1 minute when salt was placed in boiling water. Steam under pressure was effective.

PATENTS

Ready-mixed flour.

GUSTAVSON, E. G. Assignor to The Quaker Oats Co. 2,525,599, Oct. 10, 1950.

The method of producing a ready-mixed flour adapted to be subsequently baked into an edible product, comprising: first, dehydrating flour by heating flour above 100° C. for a relatively short period of time followed by rapidly cooling flour; second, mixing shortening and sugar and then adding thereto with mixing dehydrated flour, powdered skim milk, powdered whole egg, leavening agent and flavoring materials.

Wet milling of grain sorghum.

SLOTTER, R. L., AND ANDERSON, R. A. Assignors to the U. S. A. 2,527,585, Oct. 31, 1950.

In a process for the wet milling of grain sorghum, the improvement which comprises removing the outer hull of the grain, without disintergrating grain, separating the dehulled undisintegrated grain from the hulls and wet milling the separated grain.

Rice treating process.

JONES, W. W., BREWER, G. W., AND COURT, A. B. Assignors to Rice Growers Assn. of California. 2,525,137, Oct. 10, 1950.

A process of treating rice paddy for milling that comprises the steps of soaking the paddy in water having a temperature between about 180° F. and 200° F. for a period between about ten and fifteen minutes, then removing the paddy from the water and subjecting it to steam under a pressure between about 10 and 15 lbs. per sq. in. for a period of time between about 30 and 35 minutes, then progressively reducing the pressure to atmospheric pressure, then removing surface moisture from paddy and reducing its temperature.

Cake manufacture.

GARNATZ, G. F., AND DEHAVEN, MILLER B. Assignors to The Girdler Corp. 2,524,437, Oct. 3, 1950.

A method of preparing a thin, fluid batter adapted to be baked to produce cakes and muffins, which method comprises establishing a crude pourable premixture of the batter ingredients and then progressively propelling a thin stream of the crude premixture through a zone of intense agitation under back pressure, and simultaneously elevating the temperature of the composition during such agitation whereby air originally associated with the batter ingredients is finely distributed throughout the batter to form nuclei at which expanding gases may accumulate during subsequent baking of the batter, then discharging the mixed batter into a zone of atmospheric pressure whereby a batter is produced at an elevated temperature ready for baking.

Abstracts

Meringues and method of making the same.

SNELLING, J. A. Assignor to The Procter & Gamble Co. 2,524,333, Oct. 3, 1950.

A meringue powder comprising essentially a mixture of: finely divided milk powder, a substantial quantity, but not exceeding 9% of the total weight of the meringue powder, of a non-injurious strongly electrolytic substantially neutral salt chosen from the group consisting of alkali and alkaline earth metal sulfates and chlorides and mixtures thereof, and a non-injurious acidic substance in finely divided solid form in amount sufficient to produce a pH value below 7 but not less than 5 in a wet mixture obtained by mixing water with the meringue powder in the proportion of 3 to 10 parts by weight of water to each part by weight of milk powder in the meringue powder.

Butter flavoring composition.

ARMSTRONG, J. W. Assignor to Food Technology, Inc. 2,527,785, Oct. 31, 1950.

The method of flavoring food products which comprises intimately mixing therewith from 1 to 60 p.p.m. of sodium butyrate.

Concentrated fish press liquor.

GUNTHER, J. K., AND SAIR, L. Assignors to Central Soya Co. Inc. 2,525,294, Oct. 10, 1950.

A concentrated fish press water of relatively low viscosity and consisting of fish press water having a solids content of at least 50% and a proteolytic enzyme.

Apparatus for recovery of crab meat.

JOHNSON, R. M. Assignor to The Blue Channel Corp. 2,525,604, Oct. 10, 1950.

In an apparatus for recovering meat from crabs, the combination of a tubular element having unobstructed open ends, cutting means at one end and openings through its side wall at a distance from end, means for holding a crab with its ventral surface facing the cutting end of the element, means intermediate its ends for rotating the element, and means for effecting a relative movement of the element and holding means to cause the cutting means to sever a core from the body of the crab.

Method of processing citrus peel and citrus peel liquor.

BURDICK, E. M., AND ALLEN, J. S. Assignors to Texsun Citrus Exchange. 2,525,645, Oct. 10, 1950.

A method of processing citrus waste wherein the liquid wastes are separated from the solid waste comprising the steps of, pulverizing the citrus waste, adding thereto a quantity of alkaline reagent to render the subsequently separated liquid waste definitely alkaline, separating the alkaline liquid waste from the solid waste, subjecting the liquid waste to a heating wherein the products of combustion of such heating contact the liquid waste, clarifying the liquid waste, evaporating the resulting clarified liquor waste to a predetermined concentration.

Manufacture of tablet jellies.

BAKER, G. L., AND OLLIVER, M. Assignors to Chivers & Sons Ltd. 2,524,416, Oct. 3, 1950.

A concentrated pectin jelly composition in the form of a solid aqueous gel which will form a greater volume of an edible dessert jelly on dissolution in hot water followed by cooling, gel comprising an aqueous partial dispersion of pectin the methoxyl content of which pectin is within the range of from 1-8.5% based on 100% calcium pectate, an edible acid, a water soluble edible salt of a polyvalent metal and a sweetening agent selected from the group consisting of sugars, polyhydric alcohols derived from sugars by reduction, glycerine and edible sugar-containing compounds, the soluble solids content of gel being within the range of from 68 80% by weight.

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14-100

NEW SPINY LOBSTER PROCESSING TECHNIQUE DEVELOPED IN AUSTRALIA

Australian exports of spiny lobster tails (crayfish) have become quite an important factor in the economy of the producing States, particularly, Western Australia and South Australia. Since most of the tails are exported to the United States, the spiny lobster industry is of national importance as a dollar-earner, states the March 1950 *Fisheries Newsletter.*

The rapid growth of this industry has brought out the need for rapid development of techniques in the handling of spiny lobsters and in the freezing and transportation of the "tails." Since the Australian Department of Commerce and Agriculture requires that the anus and digestive tract be removed, several methods of doing this have been developed.

However, an employee of one of the processing companies in Geralton, W. A., has recently invented and patented a device for removing the anus and digestive tract. The use of this device will probably supersede all previous methods employed. The invention is a new vacuum-type machine. A vacuum pump is connected by suitable piping to a vacuum tank (the larger the better), to which is fitted a vacuum gauge. Leading from this vacuum tank is a connecting pipe which leads to a lidded receptacle. The latter is fitted with an air-tight lid, on the underside of which is fixed a baffle that goes down into the receptacle some eight inches. The connecting pipe from the vacuum tank is fitted into the lid of this receptacle on one side, and leading away, on the other side, is a flexible-hose pipe, into the end of which is fitted a stainless steel tube, threaded and fitted with washers to take the cutting tool. The cutting tool is a screw-on nickel-steel drawn pipe made razor-sharp at the cutting end, which is sufficiently large to fit over the anus. Continuous operation is allowed by having spare, sharp cutting tools.

In operation, this cutting tool is placed over the anus. The suction causes the skin around the anus to be drawn tightly against the cutting edge, thus stretching the skin to some extent and making it easy for the operator, by the exertion of hardly any pressure, to completely sever the anus. The anus, with the digestive tract, is then drawn along the flexible hose into the receptacle, hits the baffle plate, and falls to the bottom. If desired, two or more flexible hoses from the lid to the operating tables can be used, in which case a larger vacuum tank is necessary. The vacuum maintained in the plant at Geralton was 10 inches. After the removal of the anus and the digestive tract, the operator can, if he sees any blood or dirt, quickly remove it from the tail by the vacuum process. No part of the digestive tract or contents is left behind.

An officer of the Australian Department of Commerce and Agriculture has visited practically all packing establishments throughout Australia and has inspected a large number of "tails" from which the digestive tracts have been removed by various methods. In his opinion, the method just described gives a result which is hygienic and speedy in performance, and leaves nothing to be desired as far as compliance with the Australian export health regulations is concerned. —(*Com. Fisheries Rev.*, 12 [6] 35 [1950]).

THE EFFECT OF A SEAFOOD DIET ON THE RED CELL COUNT, HEMOGLOBIN VALUE, AND HEMATOCRIT OF HUMAN BLOOD

Seafood products are of major importance for their nutritional value. It is reasonable to suppose that marine animals living in a medium containing all the mineral elements needed by the human body would be a highly nutritious class of food. Since the minerals may be supplied to us in a usable form, by marine animals, we can get iron and copper to prevent nutritional anemia, iodine to prevent goiter, as well as phosphorus, copper and magnesium which are needed to regulate other body functions.

Oysters, shrimp, and crab meat, in addition to being rich sources of iron, copper and iodine contain one-half as much calcium, three times as much magnesium, and much more phosphorus than an equal quantity of milk. The oyster is comparable to liver and to milk, in its rich sources of nutrients. One pound of oysters provides about 12 percent of the energy needed by a man for one day; also 50 percent of the protein, 26 percent of the calcium, 40 percent of the phosphorus, over 184 percent of the iron, and about 110 percent of the iodine, as well as vitamin A, thiamine, riboflavin and ascorbic acid.

Fish, as well as shellfish, are good sources of protein, phosphorus, iron, and iodine. The protein content of fish is comparable to beef and liver, and is higher than that of milk.—(*Com. Fisheries Rev.*, 12 [10] 40 [1950]).

FUTURE DATES FOR FOOD TECHNOLOGISTS

1951

February 17-23. Annual Convention, National Canners Association, National Food Brokers Association, Canning Machinery and Supplies Association, Chicago, Ill.

February 27-March 2. National Frozen Food Industry Convention, San Francisco, Calif.

June 9-15. International Food Exposition, Chicago, Ill.

June 17-20. **Eleventh Annual Meeting, Institute of Food Technologists, New York, N. Y.**

August 2-September 11. Eighth International Congress of Refrigeration, London.

September 26-29. International Association of Milk and Food Sanitarians, Glenwood Springs, Colo.

September. FAO Meeting on Herring Technology, Bergen, Norway.

October. International Canning Conference, Paris.

November 5-8. Refrigeration and Air Conditioning Exposition, Navy Pier, Chicago, Ill.

(Information concerning future dates of national and international meetings, conventions and exhibits of interest to food technologists should be sent to the editorial offices.)

NEW BUILDING STARTED FOR M. I. T. FOOD TECHNOLOGY DEPARTMENT

With the family of the late John Thompson Dorrance and ranking officers of Campbell Soup Company as guests-of-honor, an outdoor ceremony was held at the Massachusetts Institute of Technology on November 15 to break ground for the Institute's newest addition, the John Thompson Dorrance Laboratory. This $2,000,000 structure which will house the departments of biology and food technology has been made possible, primarily, by a grant of $1,000,000 from Campbell Soup Company, honoring Mr. Dorrance, an M. I. T. alumnus of the Class of 1895, president of the company from 1914 until his death in 1930.

Members of the Institute faculty and hundreds of students thronged the marquee where Dr. Karl T. Compton, Chairman of the M. I. T. Corporation, presided. He introduced as speakers, Oliver G. Willitts, vice-president of the Campbell Soup Company, Dr. James R. Killian, Jr., president of the Institute, and Professor Herbert L. Beckwith of the firm of Anderson and Beckwith, architects for the new building.

Describing the physical structure, Professor Beckwith said the laboratory, 57 feet by 200 feet in plan, will be connected with all floors of an adjoining building by means of a glazed passageway. This connection at basement level is ramped to facilitate the movement of material and supplies. The laboratory will have seven floors, a basement and penthouses on the roof, providing in all about 100,000 square feet of gross area. It is planned that the Department of Food Technology will be located on the lower floors and the Department of Biology above.

The $1,000,000 Campbell grant was for the purpose of supporting the Institute's research program in the fields of biology and food technology and in related scientific and engineering fields. The grant was made under a plan whereby the Institute extends to industries and companies full opportunities to keep abreast of new developments and trends in science and technology.

WORLD RICE SITUATION—SUMMARY

Despite a modest gain in area planted, world production of rice in 1949/50 was less than in the previous year. Extensive crop failure in China and a setback in the recovery of Burma more than offset production increases elsewhere in the Far East and the harvest of a bumper crop in the Western Hemisphere.

Preliminary information on the 1950/51 crop suggests a substantial recovery of production in the Far East. A bumber crop is reportedly in prospect in the Chinese mainland. Floods and drought reported from different parts of the Indian subcontinent have not materially affected the harvest prospects for the main winter crop, but production in Assam is likely to show a decline in consequence of the eathquake. Harvest prospects in other major rice-growing countries of the Northern Hemisphere are reported to be generally good.

With the recent improvement in the internal situation in Burma, world rice exports in 1950 may exceed the

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1949 total of 3.7 million tons. At this level the volume of international rice trade would be a little over two-fifths of prewar.

The drastic reduction in India's import demand, the virtual disappearance of China as a major importer, and the emergence of Japan as the largest buyer of rice in the free markets of the Far East are the outstanding changes in the pattern and direction of international trade in rice during the current year.

Increased world supplies of wheat and coarse grains, coupled with price disparity between these grains and rice in the world markets, have reduced the pressure of import demand for rice in 1950. Although the Korean conflict has affected the world supply and demand for rice somewhat, the present indications are that the Far Eastern rice imports in the current year may be in rough balance with the regional export availability estimated at 2.5 million tons.

Rice consumption levels in the Far East remain seriously low as compared with prewar; supplies available for consumption in the region in 1950 are about 3 percent below the prewar average, whereas the total population has apparently increased by 10 percent since 1937. Increased supplies of wheat and coarse grains have partially compensated for the rice shortage, but per caput consumption of rice and other cereals varies widely in different parts of the Far East. While famine conditions, brought about by crop failure and aggravated by inadequate transport, reportedly prevailed over wide areas of continental China early in 1950, a modest gain in domestic and imported supplies has permitted several food-deficit countries either to scale down government rationing commitments or to increase the low ration levels of basic cereals in 1950. (FAO Commodity Reports, Rice No. 3, December 15, 1950.)

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REPORT ON PHARMACOLOGY AND TOXICOLOGY OF CERTAIN ORGANIC PHOSPHORUS INSECTICIDES IS NOW AVAILABLE

A recent issue of the *Journal of the American Medical Association*, **144**, 104 (1950), contained the report from the Committee on Pesticides to the Council on Pharmacy and Chemistry of the American Medical Association.

Among the functions of the A. M. A. Committee on Pesticides is the integration and interpretation of available data on pesticidal chemicals for the information of physicians. This present report is the first of a series of aspects of pesticides that are of immediate medical interest. It discusses three organic phosphorus compounds that are now commercially available and rather generally used in insecticides. This series is not intended as a complete review of the many facets of pesticidal information. It will, however, form the basis for such undertaking when monographs on individual pesticidal chemicals or groups of chemicals are prepared for the Committee's publication on pesticides.

Reprints of this report are available to those interested in the subject. Address your request to Mernard E. Conley, Chairman, Committee on Pesticides, American Medical Association, 535 North Dearborn Street, Chicago 10, Illinois.

FIFTY YEARS OF BOTULISM IN THE UNITED STATES AND CANADA

In this mimeographed report, Drs. K. F. Meyer and B. Eddie have summarized reports received from State Health Departments involving cases of intoxication due to ingestion of the toxin generated by *Clostridium botulinum* or *Clostridium parabotulinum* during the past 50 years. The analysis includes 483 outbreaks involving 1319 persons with a death rate of 65 percent. Yearly incidence is presented graphically. Cases are also presented in tabular form by year, number of cases, number of deaths, number of cases by state with a yearly analysis of these cases, the food involved in each outbreak, and the state and the year in which it occurred.

According to the analysis, foods commercially canned in the United States were responsible for only one instance of intoxication since 1925 and in that case the unprocessed food was imported. Nearly all other cases involved home prepared food. A few cases involved foods canned commercially outside of United States.

Copies of this report, dated July, 1950, may be obtained on request from the George William Hooper Foundation, University of California Medical Center, San Francisco 22, California. (Carl S. Pederson).

INTERNATIONAL RICE COMMISSION

Excerpts from Report of First Session, International Rice Commission, F. A. O.

The International Rice Commission was created after a series of inter-governmental meetings had revealed that unless some international body was given direct responsibility for concentrating on the rice problem, the position of rice producers and consumers would likely become progressively worse.

The Inaugural Session of the International Rice Commission marks a significant step in the efforts of governments to bring about the systematic development and improvement of the rice economy of the world. The Commission is charged with the responsibility of formulating a world rice policy based upon human needs and of building and promoting a program of rice production, distribution, conservation and consumption which utilizes fully the advanced knowledge of research and technology and seeks to improve the economic status and welfare of rice producers and consumers alike.

Nutritional Aspects

The following recommendations covering the nutritional aspects of the rice problem were adopted by the Commission: (See Appendix E—Report of the Nutrition Subcommittee.)

Definition of Properly Milled Rice. There is need to arrive at an international definition of properly milled rice from the point of view of nutrition by determining the optimum degree of removal of certain parts of the grain. It is recommended that further studies on the distribution of the nutrients in the various structures of the grain should be encouraged.

Parboiling. The Commission believes that the problem of parboiling should receive the most urgent attention from all authorities concerned and recommends that more study should be conducted as soon as possible on the various phases of the problem in the light of the following facts:

1. In the past, objections raised against the use of parboiled rice generally referred to unsuitably prepared products. It is now possible to obtain products of a much better quality by improved methods.

2. Parboiling makes it possible to produce from a given amount of paddy more rice with less breakage in milling; to use a lower grade of paddy; to obtain a rice with superior keeping qualities; and to retain more of the nutrients of the grain during milling, washing and cooking. As a consequence, the adoption of parboiling would result in large savings of rice and, even more important, of valuable vitamins and minerals.

3. The acceptability and digestibility of suitably prepared parboiled rice have not been sufficiently tested among populations accustomed to other types of rice.

Nutrition Research Fund

The Commission fears that the various priorities facing all governments would seriously delay the undertaking of urgently needed rice research.

It recommends that FAO explore the possibility of securing special funds for nutrition research on rice and also that it ask each member government to assist in such research by contributing funds or by

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undertaking programs of work. The Director-General should be asked to ascertain the nature and/or scale of contribution of individual countries.

Incidence of Disease and Malnutrition

The Commission has taken into consideration the serious incidence of malaria and malnutrition in rice-producing countries and wishes to support the conclusion of the nutrition experts on this problem as indicated in Appendix E.

PREFABRICATED WAREHOUSES

Standardized prefabricated refrigerated warehouses for the storage of fifty to 100 tons of perishable goods each are being built in the Soviet Union on the instruction of the Ministry of Meat and Dairy Industries. The prefabricated structure consists of two layers of pine wood separated by a layer of 2½ ins. of various types of insulating material. A typical warehouse contains a cold storage room of 665 sq. ft., a refrigerated receiving and working room of 245 sq. ft., a machine room of 185 sq. ft., and two other small chambers.—(*World Refrig.*, 1, 179 [1950]).

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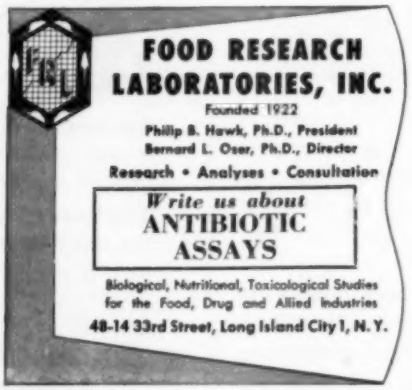
EMPLOYMENT NOTICES

Wanted: Food Technologist with experience in canning. Will have charge of quality control for three plants located in Texas. Give experience, training and references. Marshall Canning Co., Marshalltown, Iowa.

Wanted, position by Food Technologist with Chemistry background. Have 14 years personal experience in all phases of salting, pickling and packaging, both cold-pack and hot-pack pickles. Reply Box 131, Institute of Food Technologists, 176 W. Adams St., Chicago 3, Ill.

Position wanted by Food Technologist, B.S. Chicago, 14 years experience production, research, product development. Creative, cooperative, industrious. Desires executive, supervisory, or liaison position in research, production, or development. Location secondary, opportunity primary. Reply Box 117, Institute of Food Technologists, 176 W. Adams St., Chicago, Illinois.

Position wanted, Food Technologist with technical and administrative background wants position in production. 13 years varied experience in product development, quality control, production supervision, etc., on items such as canned specialties, bakers' supplies. Available reasonable notice. Reply Box 132, Institute of Food Technologists, 176 W. Adams St., Chicago 3, Ill.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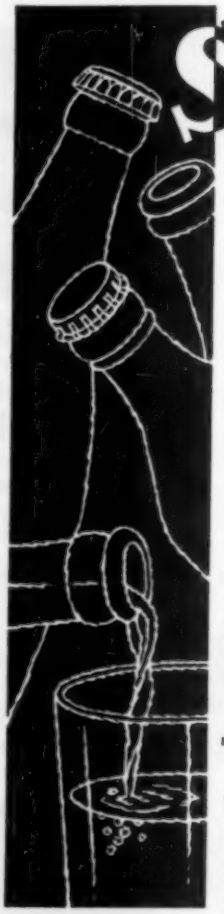

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Book Review

APPLES AND APPLE PRODUCTS. By R. M. Smock and A. M. Neubert. Volume II of Economic Crop Series edited by Z. I. Kertesz. Interscience Publishers, Inc., New York (1950). 460 pp. and index, 56 tables and 87 figures. Price $7.80.

Coming at a time in the history of the world when food is of paramount importance, the publication of this book is indeed gratifying to that group of scientists engaged in the production of foodstuffs. Although the apple has been known since prehistoric times and much has been learned and said about it, this is the first volume ever published which deals solely with the chemistry, physiology and processing of apples.

Because this book is devoted to the study of one fruit, it has been possible for the authors to treat at length the chemical, biochemical and physiological aspects of their subject. Food chemists and technologists are not alone in the benefits derived from having this volume at their command, for plant nutritionists, physiologists and plant pathologists as well as horticulturists will find here much useful and interesting information. Those engaged in research, teaching and in food processing will be delighted at the wealth of facts and data that have been brought together for them. The busy industrial food technologists especially will be grateful for the collection of this information. While architects and refrigeration engineers are not primarily interested in the technology of apples and apple products, it would be well worth their time to study at length the chapter of this book which treats on the storage of apples in the fresh state.

Although that portion of the book dealing with the historical background of the apple is brief, it is quite adequate. The chapter dealing with varieties of apples and development and structure of the apple fruit is clear, concise and is supported with well selected illustrations. Chemical composition and chemical changes, physiology as it is affected by nutrition, cultural and environmental factors are adequately discussed. Storage of apples and the various ramifications are considered in subsequent chapters. The processing and manufacture of apple products is discussed at length and the production of most commercial apple products is described in general. This well written volume is concluded with an appendix as well as both author and subject indices.

For the convenience of the reader, literature references made in the text are placed at the foot of each page. Since over a thousand references are made to published literature, this arrangement of the bibliography is a very desirable feature. The text is written in an accepted scientific style; the physical format is both substantial and attractive. Beyond a doubt, this book should be made available to all those interested in fruit products.

JAMES R. OYLER.

MODERN CHEMICAL PROCESSES. By the editors of *Industrial and Engineering Chemistry*, in conjunction with the technical staffs and co-operating organizations.

(Continued on page 18 following technical papers)

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Authors of papers intended for publication in FOOD TECHNOLOGY should request from the editorial office a copy of the booklet, entitled "Suggestions to Authors." Manuscripts submitted for publication in FOOD TECHNOLOGY should follow the style described in this booklet.

The Institute of Food Technologists assumes no responsibility for statements in contributed articles appearing in FOOD TECHNOLOGY. Editorials present only opinions of the writers and do not necessarily reflect policies of the Institute of Food Technologists.

News of the Institute

Annual Meeting Program Takes Shape

Program building, basic finance, and evening entertainment are three of the departments in which committees of the New York Section of the I. F. T., at work on the 11th annual conference, have recently reported solid progress. Topics for all of the technical sessions have been decided on with subchairmen, some of whom have already completed their panels of speakers. Sales of exhibit space have been exceptionally gratifying, assuring the local committee of working funds prior to the actual meeting. And arrangements for a theater party were virtually closed with the producers of one of the newest, and generally appealing, musicals of the current Broadway season, thus assuring both visiting and resident members of a social evening in the New York manner, without a scramble for tickets. Other committees are now starting a drive for the fullest possible attendance of members and visitors, with emphasis on early registration to facilitate advance planning.

The first general event on the conference program is set for Sunday evening, June 17, the opening day, with a discussion planned on the timely topic of atomic radiation. On Monday morning, June 18, there will be a general program. Technical sessions, some to run concurrently, are scheduled for Monday afternoon, followed by two sessions a day on Tuesday and Wednesday, June 19 and 20. Thursday, June 21, is set aside for plant trips.

Luncheon and dinner on Tuesday have been reserved for the presentation of awards, including the Babcock Medal, Food Industries Award, and the Nicholas Appert Medal. Monday evening is reserved for the theater party. Some time is left open on the five-day schedule for group gatherings and informal activities.

Of the more than 60 titles of papers planned for the symposia, more than half had been accepted from or assigned to speakers before mid-January. A final call went out in February, with every expectation that the list will be completed by mid-March. Letters will go in the mail soliciting abstracts for the printed program as well as publicity releases for the public relations committee.

Technical Sessions

Topics for technical sessions include the following: Transportation of Foods; Chemicals in Foods; Instrumentation and Control Methods in Food Processing; Control Methods, Product Protection and Shelf Life; Frozen Foods; Low Temperature Evaporation of Food Products; Developments in the Meat Industry; Food Preservation; Packaging of Foods; Military Subsistence; New Products; Consumer Acceptance Testing; Cereal Technology; Fish Products; Flavor.

The exhibit will be a high point of the Conference. Booth space, always an important source of revenue, will be sold out well before the meeting, according to present indications. There were a few desirable locations still open at the beginning of February, but these were not expected to remain available for long. Those still undecided as to space, or in touch with prospective exhibitors, should accordingly get in touch with the committee in charge as soon as possible.

Elsewhere in this issue is a tear-out form of hotel reservation blank which members planning to attend are requested to return promptly. Those undecided are urged by the local committee to complete their plans as soon as possible, especially in view of a possible tightening up of transportation accommodation and hotel reservations. Officials of the Hotel New Yorker, Conference headquarters, have assured prompt and preferential treatment of all those attending who send in advance reservation forms.

For the convenience of members who may want to get in touch with local committee chairmen, the roster follows:

General Chairman: Stephen L. Galvin, Huron Milling Co., 9 Park Place, New York 7, N. Y.

General Co-Chairman: John H. Nair, Thos. J. Lipton, Inc., 1500 Hudson St., Hoboken, N. J.

Finance: Philip D. Kratz, Hoffman Beverage Co., 400 Grove St., Newark 6, N. J.

Exhibits: R. C. Sherwood, Sterwin Chemicals, Inc., 1450 Broadway, New York, N. Y.

Publicity and Printing: Bernard L. Oser, Food Research Laboratories, Inc., 48-14 33rd St., Long Island City, N. Y., and A. A. Schaal, Co-Chairman, Good Housekeeping Bureau, 959 Eighth Ave., New York 19, N. Y.

Hotel and Housing: Ira Garard, New Jersey College for Women, New Brunswick, N. J.

Registration: Harold G. Beattie, National Bakery Div., A. & P. Co., 420 Lexington Ave., New York, N. Y.

Banquet and Luncheon: Raymond T. Bohn, General Baking Co., 420 Lexington Ave., New York 17, N. Y.

Smoker and Entertainment: Alfred Finberg, Francis H. Leggett & Co., Hudson River and 27th St., New York, N. Y.

Meetings: Daniel Melnick, Best Foods, Inc., Research Lab., Bayonne, N. J.

Guests: Ruth R. Bien, Good Housekeeping Bureau, 959 Eighth Ave., New York 19, N. Y.

Field Trips and Transportation: Lawrence Atkin, Fleischmann Lab., 810 Grand Concourse, New York 51, N. Y.

Regional Section News

NORTHERN CALIFORNIA SECTION

Officers and Committee memberships elected and appointed for 1951 are as follows:

Chairman: Edwin L. Mitchell, Richmond-Chase Co., San Jose.

Vice Chairman: Richard D. McKirahan, Research Div., American Can Co., San Francisco.

(Continued on page 10)

Canco Pioneering

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This container protected first-aid units of blood plasma in World War II. An adaptation of Canco's tennis ball can.

The salt container prevented excessive caking which took place in the old-fashioned bags. The aluminum pouring spout made easier the housewife's task.

Regional Section News

(Continued from page 6)

Secretary: John H. Kilbuck, University of California, Berkeley.

Treasurer: Prescott R. Lloyd, C & H Sugar Co., San Francisco.

Councillors: Robert N. Berry, American Home Foods, San Jose; Louis G. Petree, Continental Can Co., Hayward; Hugh T. Griswold, Owens-Illinois Glass Co., San Francisco.

Executive Committee: Prescott R. Lloyd, C & H Sugar Co., San Francisco; Harold S. Olcott, Western Regional Research Lab., Albany; Helen L. Hanson, Western Regional Research Lab., Albany; Elverton B. Stark, Western Canner & Packer, San Francisco.

Retiring Chairman: Ernest E. Jacobs, Lyons-Magnus, Inc., San Francisco.

Councillors-at-large (National): Arnold K. Balls, Western Regional Research Lab., Albany; Emil M. Mrak, University of California, Berkeley.

In addition, the following committee Co-Chairmen were elected:

Membership: H. Irwin Martin, Wm. J. Stange Co., Oakland; John M. Jackson, Research Div., American Can Co., San Francisco; Arne Eriksen, The Girdler Corporation, San Francisco.

Program: Richard D. McKirahan, Research Div., American Can Co., San Francisco.

Reception: Chester H. Bryson, Dodge & Olcott, Inc., San Francisco; Shirley I. Vollmer, Western Beet Sugar Producers, Inc., San Francisco.

Employment: Francis P. Griffiths, Western Regional Research Lab., Albany; Hans Lineweaver, Western Regional Research Lab., Albany.

Arrangements: Charles P. Collier, National Canners Association, San Francisco; Arthur M. Besemer, Golden State Co., Ltd., San Francisco.

Student Relations: Bruni Grossi, Gerber Products Co., Oakland; Chester A. Gates, Stokely Foods, Inc., Oakland.

Meeting Places: Byron E. Byrd, Belfast Beverages, Inc., San Francisco; Raymond O. Myhre, Hunt Foods, Inc., Hayward.

Publicity: Robert N. Berry, American Home Foods, San Jose.

New members reported by the Northern California Section are: Harold S. Levenson, Maxwell House Div., General Foods Corp., San Leandro; Ruth M. Chesbro, Bio-Research Laboratories, Berkeley; Bernard Feinberg, 6th Army Medical Laboratory, Oakland; Hidetoshi Takahashi, Marlo Packing Corp., San Francisco; Richard H. Toms, Thornton Canning Co., Thornton; Albert Kok, Profind Corp., San Francisco; and Eldo M. Kurtz, Cargill, Inc., San Francisco.

DIXIE SECTION

Arrangements have been made for a meeting on March 16 in Knoxville, with Mr. Arthur Downey, Vice President in Charge of Research for Magnus, Mabee and Reynard Inc., as guest speaker. His subject will be "Spice, Oils and Flavors." During the afternoon of the same day, prior to the evening meeting, an inspection will be made of facilities of the Department of Food Technology at the University of Tennessee.

At the last meeting of the Dixie Regional Section of the Institute of Food Technologists, the assembled membership of that group unanimously agreed upon the following resolution:

"Be it resolved by the Dixie Regional Section of the Institute of Food Technologists that the editorial policy of the publications FOOD TECHNOLOGY and FOOD RESEARCH be made identical at as early a date as is practical."

WESTERN NEW YORK SECTION

The following officers have been elected for 1951:

Chairman: David B. Hand, N. Y. State Agr. Expt. Station, Geneva.

Vice Chairman: Carl S. Pederson, N. Y. State Agr. Expt. Station, Geneva.

Secretary-Treasurer: William S. Conway, Jr., Richardson Corp., Rochester.

Two new members of the Executive Committee are: Lucien H. Cole, Quaker Maid Co., Brockport, and Richard Henderson, Syracuse University, Syracuse.

GREAT LAKES SECTION

The 1951 winter meeting was held on January 19, at the Sheraton Hotel in Detroit, Mich. In the morning a special tour was made of Farmcrest Bakeries, and in the afternoon, at the hotel, the following papers were heard:

"Technical Developments Behind the 'Brown 'n Serve' Prebaking Process," by Robert H. Anderson, General Mills, Inc.

"Personnel Administration Within the Food Industry," by J. J. Gannon, Personnel Manager, Diamond Crystal Salt Division, General Foods Corporation.

"Recent Developments on the Use of Antioxidants for Foods," by Lloyd A. Hall, Griffith Laboratories, Inc., Chicago.

In the evening Mr. Shiler L. Bass, Assistant General Manager, Dow-Corning Corporation, spoke on "Use of Silicones in the Food Industry."

The spring meeting will be held on April 20 in Cleveland, Ohio.

MARYLAND SECTION

The January meeting of the Maryland Section was held on Friday, January 12, 1951, at the Hotel Stafford in Baltimore. Speaker was Dr. Roy Magruder of the Agricultural Research Administration, Department of Agriculture, and his topic was "The Impact of the Research and Marketing Act on Food Technology." In view of this Section's past interest in the direction and scope of the research carried out by the U. S. D.A. and the Experiment Stations, this subject was a very live one.

Section officers for 1951 elected at the December meeting are:

Chairman: Amihud Kramer, University of Maryland, College Park, Md.

Vice-Chairman: Basil W. Clarke, The Crosse and Blackwell Co., Baltimore, Md.

Treasurer: Charles S. Mason.

Secretary: Edgar Heyl, Baltimore, Md.

Councillors: Albin H. Warth, Crown Cork and Seal Co., Baltimore, Md., and Maurice Siegel, Strasburger and Siegel, Baltimore, Md.

Elected to the Executive Committee: F. J. Weiss, Washington, D. C.

(Continued on page 21 following technical papers)

"IF THERE IS ONE WAY BETTER THAN ANOTHER, IT IS THE WAY OF NATURE."

—Aristotle

Science has torn apart many of nature's secrets and has sought to duplicate or improve upon them for the benefit of mankind.

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Selected Abstracts

ANALYTICAL METHODS

Testing of foods for thickeners, especially meat products for locust-bean seed meal.

WYLER, O. *Mitt. Lebensmitt.-Untersuch. Hyg., 41,* 46-55 (1950); Brit. Abst., C, 341, No. 2756 (1950).

A scheme for identifying thickeners, especially locust-bean seed meal (carubin), in meat products (sausages) is given. From an aqueous extract (100 g. of the sample boiled with 200 ml. water for 0.5 hours, cooled, and centrifuged) gelatin, pectin, alginic acid or carboxymethylcellulose ('Glykocellon') may be precipitated by aqueous $K_4Fe(CN)_6$ and $ZnSO_4$; the solution may contain starch, methylcellulose (Tylose), or carubin; starch, if present, is destroyed by diastase, after which aqueous tannin causes precipitation of methylcellulose and carubin; the precipitant caused by the former is soluble, and by the latter insoluble, in 50% ethanol; specific for carubin is a gelatinous precipitant with borax in aqueous solution. 0.1% of carubin in sausages, or 0.01% in aqueous solution, can be demonstrated. Known tests for identifying the other thickeners are given. Thickeners permit the incorporation of undue amounts of water in foods.

Determination of theobromine in cocoa products.

HOLMES, K. E. *Analyst, 75,* 457-61 (1950).

The existing methods for determining theobromine in cocoa and its products are described and a new and improved procedure is proposed. In this, the alkaloid is completely extracted by means of boiling water and magnesia, clarified with lead acetate, filtered, concentrated and extracted with chloroform. The alkaloidal residue from the chloroform extract is then assayed by Boie's method. By this procedure the results are equal to, and sometimes higher than those by Wadsworth's method. A rapid continuous extractor, for use with chloroform, is described.

Quick determination of humidity in flours and cereals.

DESCHREIDER, A. R. *Bull. ecole meuneric belge, 12,* 89-92 (1950); *Chem. Abst., 44,* 8010f (1950).

A new device (Buhler Bros., Brussels) consisting of a torsion balance, combined with a drying element dries 10 g. of flour at 125-130° in about 5 minutes. The accuracy is about 0.1-0.2% and the gain in time is considerable.

Note on an examination of the Bendix method for determining coating thickness on tinplate.

SALT, F. W. Brit. Iron Steel Ass., Lond., Paper MW/C/48/48; *Pack. Abst., 7,* 411, No. 1529 (1950).

The method developed by Bendix, Stammer, and Carle to determine the weight of tin coatings is considered reasonably accurate provided the time of treatment is not unduly prolonged beyond that required to strip the coating. This method consists in removing the tin by anodically polarizing, in hydrochloric acid containing iodine, a tinplate disc suspended by its edge from an electromagnet. Porous pots on either side of the disc enclose carton-rod cathodes. The iodine is reduced by the tin entering the solution, and the weight of tin removed is calculated from the decrease in the iodine content of the anolyte.

The determination of the purity of propylene glycol.

MIDDLETON, G., AND STUCKEY, R. E. *Analyst, 75,* 406-10 (1950).

A description is given of a test using the critical solution temperature of propylene glycol and ether. With this test, the presence of 0.1% of ethylene glycol, 0.1% of di-propylene glycol or similar amounts of water and ethyl alcohol in propylene glycol can be determined.

BIOLOGICAL SCIENCES

NUTRITION

Spontaneous activity in rats fed an amino acid-deficient diet.

BEVAN, JR., W., LEWIS, G. T., BLOOM, W. L., AND ABESS, A. T. *Am. J. Physiology, 163,* 104-10 (1950).

Ten rats were placed in activity wheels for a continuous period of 125 days. Five were fed Purina laboratory chow during a 3-hour feeding period each day, while the remaining 5 were maintained on an experimental diet deficient in lysine and probably other amino acids. The following results were obtained: The experimental animals showed no significant weight changes over the entire period of the investigation, as contrasted to the apparently normal weight gain of the control group. The experimental group showed lower than normal hemoglobin concentrations. The activity levels for the experimental group were in general higher than those of the control group, cycles similar to those reported by previous investigators being present in the records of the former. The food intake of the experimental animals was reliably less than that of the controls and showed a gradual decline.

Studies on the comparative nutritive value of fats. 13. Growth and reproduction over 25 generations of Sherman diet B where butterfat was replaced by margarine fat, including a study of calcium metabolism.

DEUEL, JR., H. J., GREENBERG, S. M., SAVAGE, E. E., AND BAVETTA, L. A. *J. Nutr., 42,* 239-55 (1950).

The multigeneration experiment with a hydrogenated vegetable margarine fat replacing butterfat in Sherman diet B has now been successfully completed through 25 generations indicating that a hydrogenated vegetable margarine can supply the fat requirements of the rat over this period of time. No differences were found between the hydrogenated vegetable margarine fat diet and that containing butter.

Nutritive value of canned foods. 42. A study of the protein value of young and mature peas. (Pisum sativum.)

CHITRE, R. G., WILLIAMS, J. N., AND ELVEHJEM, C. A. *J. Nutr., 42,* 207-19 (1950).

The effects of canning on the biological value for young growing rats of the protein in peas have been investigated. It appears that canning does not decrease the biological value of nearly mature peas, while it enhances that of immature peas. Investigations concerning the cause of the poor biological value of immature raw peas suggest that hydrolysis of the protein and subsequent deamination of its amino acids occur through enzymatic action when the peas are moistened. Canning destroys the enzyme activity. A complete analysis of immature and nearly mature raw peas and immature and nearly mature canned peas for essential amino acid content has been presented.

Tuberculosis and nutrition.

POULSEN, O. *Ugeskrift for Laeger, 112,* 135-42 (1950); *Am. J. Digestive Diseases, 17,* 348 (1950).

Investigation of Seventh Day Adventists living on an ovo-lacto-vegetarian diet (pork, alcohol, spices, and stimulants prohibited) for cancer morbidity disclosed an increased tuberculosis morbidity among women 15 to 44. The disease occurred chiefly in persons who had been members of the community for many years. A large number of cases had a rapid course promptly fatal in adolescence. Diets, poor in fat, probably poor in available first class protein, lead to the assumption that the increased tuberculosis incidence was caused by insufficient protein for antibody production as well as being low in calories.

FOOD PRODUCTS

Whole meal.

Meldinger No. 1, 15, Jan. 20, 1950; *World Fish Abst., 1,* 23, Sept.-Oct., 1950.

Reference is made to the various methods for the manufacturer of whole meal from herring. This may be produced by adding the stickwater to the meal and drying the mixture. The herring material may also be dehydrated before pressing or extraction in order to retain the soluble material in the meal. The major part of the solids contained in stick-water or fish solubles consists of proteins and other nitrogenous components which may be removed from the whole meal by water extrac-

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Abstracts

(Continued from page 14)

tion. It has, therefore, been tentatively decided to use the contents of water soluble proteins (nitrogen content in water soluble part, multiplied by 6.25) as a means of distinguishing whole meal from ordinary herring meal. Tentatively it has been decided that 20% of the proteins should be soluble in water if the meal is to be designated 'whole meal.' No official method of analysis has yet been prescribed, but the official Agricultural Chemical Control Stations in Trondheim and Bergen recommend the method described here. Ten grams of herring meal are weighed into a 250 cm.³ volumetric flask, 200 cm.³ water added and the mixture heated for 30 minutes in boiling water and stirred occasionally. The material is then cooled and water is added to the 250 cm.³ mark. The liquid is filtered through a folded filter. 50 cm.³ are then removed, sulfuric acid and mercury added and the mixture digested according to the Kjeldahl method. When the water is evaporated, potassium sulfate is added to prevent foaming. The content of water soluble proteins is calculated in percent of total protein. It should be noted that, so far, the method cannot be used as a measure of the value of the meal, but only to distinguish meals manufactured according to various processes. The question of the degree to which the vitamins are retained in whole meal has still not been sufficiently investigated.

Temperature during cacao fermentation.

PHILLIS, E. *Proc. Agr. Soc. Trinidad and Tobago, 48,* 223-5 (1948); *Chem. Abst., 44,* 9082c (1950).

The temperature during fermentation of cacao beans rose first to 37-40° and increased to 52-54° after approximately one week. The visible changes of fermentation occurred at the higher temperature but could not be obtained if the beans were heated at once to 50°. The first phase can be shortened by turning the beans and seems to be anaerobic.

Handling frozen eggs for best results in the bakery.

GLABAU, C. A. *Bakers Weekly, 148,* 46-8, Oct. 23, 1950.

Frozen egg whites taken from the outer section of the can give better results in angel food cakes than those taken from the center or 'core' of the can.

INDUSTRIAL CHEMISTRY

Quality control charts with constant limits for subgroups of different size.

LANGMAID, JR., J. F., AND COBB, H. W. *Tappi, 33,* 485-6 (1950).

In the use of Shewhart control charts, the best choice of rational subgroups sometimes leads to subgroups of different size. The usual construction of control charts then displays wider limits for small groups than for large ones. This can be a source of confusion in reading the chart, because the statistical meaning of the limits is the same regardless of their width. To avoid confusion, a simple transformation has been devised which eliminates the influence of subgroup size on the location of limits but leaves their meaning unchanged.

PACKAGING

The corrosion of aluminum and aluminum alloys by citric acid and citric acid-salt solutions.

BRYAN, J. M. *J. Sci. Food Agric., 1,* 84-7 (1950).

The results of a comprehensive series of tests on the corrosion of four different grades of aluminum and two aluminum alloys by a dilute acid and acid salt solution at different temperatures under static and agitated conditions. The results show that aluminum (purity range 99.25-99.993%). Al-Mn. (1.17% Mn.) and Al-Mg.-Mn. (1.78% Mg., 0.45% Mn.) alloys resist a dilute solution of citric acid at room temperature whether agitated or not. The rate of corrosion was approximately doubled per 10° C. rise in temperature; the life of equipment would be very short at boiling temperature. In the presence of salt, the corrosion rates of the two alloys and of all the grades of aluminum tested, with the possible exception of the purest grades, would be too high to permit their use even at room temperatures, unless oxygen was excluded. In general, the corrosion was greater the lower the grade of aluminum and, under all but one of the conditions tested, the two alloys corroded most.

Uses for silicone rubber in the food industry.

Food, 29, 414 (1950).

The advantages of silicone rubber gaskets are indicated. The chief advantage is its resistance to wide temperature ranges (—82° F. to 325° F.). As a result, it is expected that this material will be used extensively by the British food industry.

The toxicity and repellence of organic chemicals towards termites, and their use in termite-proofing food packages.

CHAMBERLAIN, W. F., AND HOSKINS, W. M. *Hilgardia, 19,* 285-307 (1949); *Pack. Abst., 7,* 411, No. 1532 (1950).

A method of comparing the resistance of various packaging materials to termite penetration is described in detail. The effect of treating paper and other bag materials with a large number of toxic or repellent chemicals was investigated and among the compounds showing marked toxicity, hexachlorocyclohexane, DDT, 3.5-dinitro-o-cresol and its salts with phenothiazine or acetic acid were especially effective when used in wax. These all remained highly toxic and prevented the insects from boring through the treated papers for more than 6 months, although the dinitro compounds and hexachlorocyclohexane were considered unsuitable for treating food papers. Twenty substances repellent to the *Zootermopsis spp.* are listed.

PATENTS

CEREALS AND GRAINS

Puffed waxy cereal food and process of making same.

ALDERMAN, M. W. Assignor to General Foods Corp. 2,526,792, Oct. 24, 1950.

A process for preparing a puffed cereal food product which comprises the steps of cooking waxy cereal starch material and over-puffing the cooked material. A cereal food product comprising crisp, friable, toasted and puffed particles of cooked waxy cereal starch material.

Nutritional and conditioning composition for baked wheat flour products.

HANDLER, J. J., AND PRATT, JR., D. B. Assignors to Chapman & Smith Co. 2,530,056, Nov. 14, 1950.

A nutritional and conditioning composition for dough containing wheat flour and yeast, composition comprising the following ingredients in the following proportions, by weight: Soya flour containing between zero and six percent fat, 2 to 5 parts; Calcium sulphate ($CaSO_4$), .003 to .02 parts; Malted wheat flour, .04 to .45 parts.

Process for removing seed coat from grain.

THRASHER, W. B. Assignor to Tex-O-Kan Flour Mills Co. 2,530,272, Nov. 14, 1950.

A process for removing the seed coat from cereal grains comprising treating the grain with an oil, fat and wax extraction solvent, substantially completely removing solvent together with the oily, fatty and waxy materials extracted from the seed coat, subjecting the grain to an aqueous solution containing alkaline reagent, alkaline reagent being present in maximum concentration of about 2%, until the seed coat is substantially only swelled and loosened, removing alkaline solution from the grain, and separating the seed coat from the interior portion of the grain.

Bulk dispensing cabinet for popcorn and the like.

LADGE, M. 2,529,877, Nov. 14, 1950.

A device for displaying and dispensing popcorn and the like comprising a cabinet closed on all sides having erect side walls through which the popcorn within the casing can be seen, a removable screen partition extending completely across the

(Continued on page 20)

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Book Review

(Continued from page 2 preceding technical papers)

Reinhold Publishing Corporation (1950). 222 pp. Price $4.50.

This is a collection of articles published monthly since 1948 in *Industrial* and *Engineering Chemistry* under the heading "Staff-Industry Collaborative Reports." Written by an associate editor of this journal with the aid of company engineers, these articles describe in considerable detail the principles involved in the manufacture of particular commodities. The format of the book closely resembles that of the parent journal and abounds with good photographs, flow sheets of different processes and schematic diagrams of individual pieces of equipment. Extensive bibliographies are given at the end of each article and often these references specifically mention the equipment by catalogue numbers. The various processes are described in a readable manner even though a great amount of detail is presented.

This volume should be very useful as a reference book in teaching chemical engineering or as an aid in industrial production problems but its value in the food industry is limited. In the present volume only three articles; Commercial Chromatographic Production of Carotene and Chlorophyll, Solvent Extraction of Oil from Soybeans, and Citrus Fruit Processing may be cited as being of direct interest to the food technologist. Unfortunately the latter article does not include descriptions of the low temperature concentration of citrus juices.

J. C. Moyer.

Homogenized Milk — A Review and Guide. G. Malcolm Trout. Memoir Bulletin, Michigan State College Press. East Lansing, Michigan (1950). 233 pp. Price $3.75.

Dr. Trout, who without doubt has pursued more investigations connected with homogenized milk than any other individual, announces that this book resulted from an effort to assemble a digest of the existing literature specifically pertaining to this subject. The citation of 451 references testifies to a most complete coverage of the literature and to the great amount of work performed by the author in classifying the material into the large number of categories under which it is presented.

The subject is exhaustively covered, perhaps a little monotonously so in places. Included are a history of homogenized milk and of the development of the machine used for its accomplishment; the effect of the process on the chemical and physical properties of milk with separate consideration being given to the fat and protein phases; the application of homogenization to the commercial production and distribution of milk and a consideration of the problems which have been encountered; laboratory methods of control; and a discussion of the characteristics of homogenized milk in which the consumer should be interested. Actually, the treatise covers everything of any importance which has been published concerning the subject. For this reason it is particularly valuable as a source of ready information not otherwise available short of a search through many references.

Dr. Trout presents most of the sub-topics as series of statements taken from the publications of the many experimenters and writers who have reported on one or more phases of the subject of milk homogenization. While this brings the conclusions of many authorities together where they can be readily compared, the relative lack of comment or interpretation on the part of the author may, in some cases, leave the uninformed reader with a rather inadequate idea of the generally accepted viewpoints which at present prevail. This is a minor criticism. On the whole the review appears to be a very useful compilation of the existing knowledge of the subject and the book should enjoy a demand on the part of all those directly or indirectly concerned with the processing, distribution or use of homogenized milk.

F. J. Doan.

WHEAT, THE UNIVERSAL GRAIN

Originating from two or three wild species through hybridization, mutation, and the effects of selection and cultivation, the races of wheat have become as complex in constitution as the human race, and among the almost endless number of varieties and forms which exist, wheats are to be found suitable to the needs of Agriculturists in all parts of the world.

Wheat is grown in every country in Europe and Asia, with the exception of Indo-China, and large areas are devoted to it in Australia and New Zealand. In Africa, it is an important crop in Abyssinia and along the Mediterranean coast from Egypt to Morocco. Within the tropics it is also grown in British East Africa and Nigeria. In the Western Hemisphere the vast wheat fields of Canada and the United States are well known, and it is grown in Mexico, and in nearly all the countries of South America.

The crop is harvested in one country or another all the year round, as indicated below:

January: Australia, New Zealand, Chile.

February: India.

March: India, Upper Egypt.

April: India, Persia, Asia Minor, Lower Egypt, Mexico, Cuba.

May: Japan, China, Central Asia, Morocco, Algeria, Tunis, Texas.

June: Southern France, Spain, Italy, Greece, Turkey, Japan, South U.S.A.

July: France, Germany, Austria, Hungary, Rumania, Bulgaria, South Russia.

August: United Kingdom, North France, Belgium, Holland, Central Russia, Canada, U.S.A.

September: Scotland, Sweden, Norway, Canada.

October: North Russia, Finland.

November: South Africa, Argentina, Peru.

December: Burma, Australia, Argentina.

From an advertisement of Wheat Industries (Australia) Pty. Ltd. in *Food Technol. in Australia*, 2, 190 (1950).

PRODUCTION AND USES OF ANTIBIOTICS

The following are notes on a recent address before the Chicago Investment Analysts' Association by Mr. John E. McKeen, president of Chas. Pfizer & Co.:

Antibiotics, the drugs derived from earth molds, introduced less than a decade ago, now represent by all odds the largest single item in the entire ethical drug line, exceeding in value even such items as ethical vitamins. In 1949, antibiotics accounted for 22 percent of the total value of all ethical drugs manufactured. One dollar out of every four spent in 1950 for prescription drugs will be for antibiotics. In 1948 the N. Y. Department of Hospitals spent nearly one half its total budget on penicillin and streptomycin alone.

Terramycin, the newest wide-spectrum antibiotic, not only affects disease bacteria, as does penicillin, but also is active against rickettsial and viral-like infections which penicillin does not destroy.

The scope of earth-mold drugs is already so great that at the present time apparently 30 to 50 percent of illnesses requiring the attention of a physician may be treated with antibiotics.

The role of antibiotics is not limited to medical usage; vitamin B-12 was discovered in culture filtrates of such mold drugs as streptomycin, aureomycin, and terramycin. Vitamin B-12 is one of the "growth factors." When as little as four pounds of fermentation product are added to a ton of animal feed, the growth rate of chickens, turkeys, and swine is increased as much as 50 percent.

Several antibiotics can act as powerful growth stimulants over and above that produced by vitamin B-12 alone. Thus the whole field of nutrition has been opened to antibiotics, and new avenues of research provided into the relationship of antiobiotics to vitamins.

THE MEXICAN FISHERIES INDUSTRY

The Pacific Coast of Mexico provides about 76 percent of the total fish taken in Mexican waters, compared with only 1 percent for the Gulf Coast. The principal west coast

(Continued on page 25)

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To those who have not used our service, we suggest a simple way in which you can prove the advantage of using Huron MSG and HVP. For example, in . . .

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To corned beef hash and hamburgers add 2-3 ozs. MSG per 100 lbs. of product. In stews and meat and vegetable mixtures use MSG from 1-4 ozs. per 100 lbs. For those meat and vegetable mixtures with strong braised meat flavors, Huron HVP products are more suitable. While these are prepared as liquids, pastes, and powders, the liquid HVP is more convenient for use in the products above at levels ranging from ½ lb. - 2 lbs. per 100 lbs. of product.

In pork sausage, wieners, bologna, loaves and similar meats use MSG at levels from 1-4 ozs. per 100 lbs. of product.

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Abstracts

(Continued from page 16)

inside of the cabinet, a dispensing door hinged substantially in the plane of the screen partition having front and side elements and adapted to be swung in a V-angle outwards and downwards, door having a plate positioned above it attached to the forward side wall of the casing and extending inward over the door in its closed position, conduit means at the corners of the casing extending through screen to the inside just short of the top of the casing and means positioned below the screen having an inlet communicating with conduit for drawing air through the conduits and an outlet for sending it up through the screen.

Manufacture of an egg-white-substitute from cereal germs.

GORBACH, G., AND TAGGER, H. B. P. 632,197, Jan. 15, 1947; *Brit. Abst., BIII*, 235 (1950).

Cereal (e.g., wheat, rye, maize) germ is extracted with Et_2O or with a chlorinated aliphatic hydro-carbon at $<70°$ until the fat content is $<0.3\%$. The ground product is claimed to have the aerating and coagulating properties of egg white and to be of high nutritive value.

COFFEE AND COCOA PRODUCTS

Preparation of green coffee.

JOHNSTON, W. R., AND KIRBY, G. W. Assignors to Standard Brands Inc. 2,526,872, Oct. 24, 1950.

A process of preparing green coffee from coffee cherries which comprises drying the cherries or pulped beans without injury to the beans and then removing the dried shell from the beans, the cherry substance being maintained throughout the process in a substantially non-fermented state.

Preparation of green coffee.

JOHNSTON, W. R., AND FOOTE, H. E. Assignors to Standard Brands Inc. 2,526,873, Oct. 24, 1950.

In a process of preparing green coffee from coffee cherries, the step of treating pulped coffee beans with a preparation of pectic enzymes until the pulp is loosened.

Methods of an apparatus for conditioning chocolate.

J. W. Greer Co. B. P. 631,129, Jan. 19, 1947; *Brit. Abst., BIII*, 236 (1950).

Chocolate is tempered by pumping it from a melting kettle through a series of vertically-spaced water-jacketed tanks, each having a series of outlet tubes through which the liquid chocolate is discharged in small streams, falling to the tank below through an air space in which cooled air is circulating. 3 diagrams.

FATS

Stabilized fat compositions.

GYORGY, P. Assignor to Wyeth, Inc. 2,526,865, Oct. 24, 1950.

A stabilized composition of matter comprising a substance containing a significant % of fats susceptitble to oxidation, and an antioxidant mixture of an hydroxychroman and rice bran extract in an amount ranging from about 2 to about 10% of the entire composition, hydroxychroman constituting from about 0.02 to about 0.3% of mixture.

Method of producing aromatized butter by cooling rich cream, and product thereof.

STIGEN, A. L. Assignor to Aktiebolaget Separator. 2,529,232, Nov. 7, 1950.

In the process of producing an aromatized butter having good keeping qualities, in which butter fat contained in rich cream is converted from a dispersed phase to a continuous phase by cooling the cream, thereby forming from the continuous liquid phase of the cream, moisture droplets of smaller size than the moisture droplets in butter obtained by working the butter fat to effect the phase conversion, and in which aromatics are introduced into the material being processed at such a stage of the process as to be included in the final product, the improvement which comprises mixing with the material the aromatics

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Regional Section News

(Continued from page 10 preceding technical papers)

PHILADELPHIA SECTION

The January meeting was held on January 25, at the Drexel Institute of Technology, when Mr. E. W. Myers, Chief Chemist, Hershey Chocolate Company, Hershey, Pa., discussed "Cocoa—Varieties, Uses and Modern Application."

PERSONNEL

Ivo Bledsoe who has been a member of the Northern California Section, has moved to Florence, Kentucky.

John Brekke, Northern California Section member, has been transferred to the U. S. Fruit and Vegetable Laboratory of the Bureau of Agricultural and Industrial Chemistry at Washington State College, Pullman, Wash.

John B. Brown has been appointed to become Director of the Institute of Nutrition and Food Technology at the Ohio State University, College of Medicine, Columbus, Ohio. Dr. Brown was previously Professor of Physiological Chemistry and was a research chemist for Swift and Co. before joining the University. He succeeds Dr. Thomas S. Sutton who resigned the directorship last fall to become Assistant Dean of the College of Agriculture.

William V. Burnett, Canning Technologist with the Continental Can Co., Oakland, Calif., has been transferred to that company's Baltimore, Md. office.

Horace B. Cosler, formerly of the Farley Manufacturing Company, is now on the staff of the General Products Division, Quartermaster Food and Container Institute, Chicago. Mr. Cosler has a background of many years in candy production and his function at the Institute will be directing the work on new and improved confection items for use in Armed Forces rations. In this connection he will prepare on the basis of developmental work the confection specifications used in the procurement of these items.

A. Davidson, for the past 15 years research chemist with Palestine Oil Industries "Shemen" Ltd., Haifa, Israel, has relinquished that post to establish himself as an independent consultant. He is an Institute member. His address is P. O. Box 1102, Haifa, Israel.

James M. Gorman has been appointed Director of the National Egg Products Association Laboratory, Chicago, Ill.

O. J. Kahlenberg, former Director of Research for the National Egg Products Association, has been appointed Director of Research and Product Development of the F. M. Stamper Company, Moberly, Missouri, and its canning division, Banquet Canning Company. Dr. Kahlenberg will supervise quality control of all products of the company and direct research in the fields of frozen and dried eggs, canned and ready-to-cook chicken and turkey, and the utilization of by-products.

C. L. Roadhouse, Professor of Dairy Industry at the University of California at Davis, is retiring from active duties.

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ONE ROOM FOR 3 PERSONS PER DAY	$11.50 ☐ $12.00 ☐	$13.00 ☐ $14.00 ☐
FOUR OR MORE IN ONE ROOM PER DAY	$3.00 Per Person ☐	
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Membership

Write to nearest regional secretary, if within an area covered by a regional section, or to the Executive Secretary of the Institute, for an application form and information regarding qualifications and classifications.

Regional Section News

(Continued from page 21)

FOSTER D. SNELL, New York consulting chemist, has been appointed to the advisory commission in Chemical Technology of the State University of New York Institute of Applied Arts and Sciences.

GEORGE STEWART, member of the Northern California Section, is taking over the duties of Chairman of the Poultry Department at the University of California at Davis.

CHARLES G. FERRARI joined the J. R. Short Milling Company of Chicago, Ill., as Technical Director. Formerly, Dr. Ferrari was Director of the Baking School of Dunwoody Institute at Minneapolis, in charge of the Chemical Research Division of General Mills, Inc., and later assistant to the vice president in charge of Research for Standard Brands, Inc.

KEITH FITCH, engineering associate with W. J. O'Connell and Associates, San Francisco, is now located with the Rose Exterminator Co. in San Francisco.

XIIth INTERNATIONAL CONGRESS OF PURE AND APPLIED CHEMISTRY, NEW YORK, N. Y.

The XIIthe International Congress of Pure and Applied Chemistry will be held in New York, N.Y., U.S.A., in September 1951 in connection with the 75th Anniversary Meeting of the American Chemical Society. The Section on Food, Nutrition and Agricultural Chemistry will welcome research papers, on food, nutrition and agricultural chemistry from all foreign and American research workers who plan to attend the New York meetings. Application blanks and detailed information can be obtained by writing to Dr. Harry L. Fisher, Administrative Assistant, 2101 Constitution Avenue, Washington 25, D. C., U. S. A., or to Dr. R. Adams Dutcher, Secretary Section 6, Food and Nutrition, Pennsylvania State College, State College, Pennsylvania, U. S. A.

FUTURE DATES FOR FOOD TECHNOLOGISTS

1951

June 9-15. International Food Exposition, Chicago, Ill.

June 17-20. **Eleventh Annual Meeting, Institute of Food Technologists, New York, N. Y.**

August 2-September 11. Eighth International Congress of Refrigeration, London.

September 8-13. XIIth International Congress of Pure and Applied Chemistry.

September 26-29. International Association of Milk and Food Sanitarians, Glenwood Springs, Colo.

September. FAO Meeting on Herring Technology, Bergen, Norway.

October. International Canning Conference, Paris.

November 5-8. Refrigeration and Air Conditioning Exposition, Navy Pier, Chicago, Ill.

(Information concerning future dates of national and international meetings, conventions and exhibits of interest to food technologists should be sent to the editorial offices.)

Abstracts

(Continued from page 20)

in droplets more coarsely dispersed and a larger size than first moisture droplets, whereby the final butter product contains finely dispersed and comminuted moisture droplets formed, in phase conversion, from the continuous liquid phase of the cream, and also contains larger and more coarsely dispersed moisture droplets, which, after the phase conversion, include the major part of the aromatics.

FISH AND SEAFOOD

Method of treating fish for canning.

Hermitikkindustriens Laboratorium. B. P. 635,204; *Pack. Abst., 7,* 445, No. 1742 (1950).

The natural seasoning of canned fish is accelerated by adding to the fish, prior to canning, a small quantity of a reducing agent (e.g., potassium sulphite or bisulphite, sulphur dioxide or hydrogen sulphide).

Method of opening oysters.

Pogany, J. W. 2,530,783, Nov. 21, 1950.

A method of opening oysters and other bivalves comprising confining the fresh oysters within an air-tight chamber and subjecting the chamber to vacuum, until the oysters have opened.

FRUIT AND FRUIT JUICES

Juicing machine.

McCulloch, F. L. 2,528,533, Nov. 7, 1950.

A machine for extracting juices from fruit or the like, comprising a base; spaced pairs of wheels journalled on base having opposed spaced notches in their peripheries, one pair of wheels being driven; an endless series of cups having a substantially horizontal upper run running around pairs of wheels, cups having oppositely extending lugs adjacent their rear ends adapted to successively engage the successive notches of wheels; pairs of chain links connecting adjacent pairs of lugs; a presser wheel journalled on the base above the upper run of series; a radially disposed series of yieldably mounted pressers carried by wheel and adapted to successively engage successive cups of the series as the upper run moves thereunder; cups having slots in their bottoms; means for feeding fruit into the successive cups as they approach upper run; means adapted to enter the slots in the successive cups to slit the fruit therein as the pressers engage the tops of the fruit; and means for collecting the juice which drops through the slots of the cups in the upper run.

Process of ripening picked fruits.

Hills, W. D., and Hills, L. D. B.P. 632,430, June 3, 1946; *Brit. Abst., BIII,* 236 (1950).

Underripe fruits, such as tomatoes and pears, are ripened after picking by storing in a special insulated container within which air at 21-27° and 80-85% R. H. is circulated. C_2H_4 (1 pt. in 5000 pts.) may be mixed with the air.

Process of recovering soluble solids from fruit waste.

Ash, C. S. 2,530,322, Nov. 14, 1950.

The process of recovering soluble solids, such as sugar, from fruit waste, that comprises the steps: grinding waste, then digesting waste in the presence of a pectase until substantially all of the pectin is destroyed, then coagulating the albumins in the digested waste and finally separating the insoluble solids from the soluble solids.

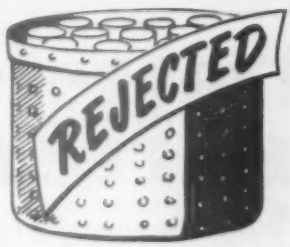
GELATIN AND GUMS

Gelatin derivatives.

Yutzy, H. C., and Frame, G. F. Assignors to Eastman Kodak Co. 2,525,753, Oct. 10, 1950.

(Continued on page 24)

THOUSANDS OF CANS SPOILED



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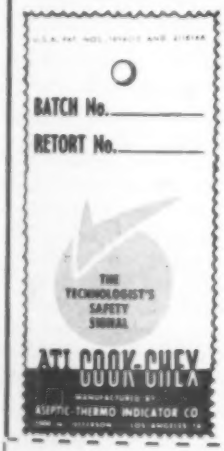

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Abstracts

(Continued from page 23)

The method of preparing a gelatin derivative which comprises reacting gelatin with a decarboxylic acid anhydride selected from the group consisting of phthalic, succinic, maleic and the chloro-, bromo- and sulfo-substituted anhydrides corresponding thereto in an aqueous system in which the pH is maintained at between 7 and 12 at a temperature of 30-70° C. for a non-degrading time of not more than forty minutes after the anhydride has been completely added.

Gum guaiac treatment.

Black, H. C. Assignor to Swift & Co. 2,529,446, Nov. 7, 1950.

The method of treating gum guaiac to prevent color formation when gum guaiac is employed to stabilize fatty material to be used as a shortening in the preparation of baked products, comprising: treating gum guaiac with hydrogen peroxide at a temperature of about 140° to 170° F. whereby its potential color-forming characteristic is destroyed.

NUTS

Process for the manufacture of peanut protein.

Arthur, Jr., J. C. Assignor to the U. S. A. 2,529,477, Nov. 14, 1950.

A process of preparing a dense, heavy, protein curd having a relatively quick settling rate, comprising: preparing a water-peanut meal suspension in the weight ratio of 10 parts of water to 1 part of meal; adjusting the pH of the suspension to about 7.5 with sodium hydroxide to peptize the protein; removing the insoluble portion of the meal and washing it with water which increases the ratio to 15 parts of water to 1 part of meal; introducing gaseous sulfur dioxide until the pH of the solution is about 4.5, the temperature during the introduction being maintained at 73° to 90° F., the rate of introduction of the SO_2 gas being about 0.23 lb. per min. per 100 lbs. of peanut meal and isolating the protein curd from the liquor by physical separation.

PRESERVATION

Method of sterilizing.

Singh, A. D. Assignor to Institute of Gas Technology. 2,529,710, Nov. 14, 1950.

A method of sterilizing corn meal which comprises feeding corn meal into a confined space accessible to the traversing flow of a gas therethrough, flowing a gas through space at a rate sufficient to fluidize corn meal, maintaining the temperature within space high enough to sterilize corn meal, discharging corn meal from space, forming the discharged corn meal into a suspension in a rapidly flowing gas under pressure and suddenly expanding the flowing gaseous suspension of corn meal to explosively shatter corn meal whereby in the event of discoloration effected during sterilizing step the color of the corn meal is improved.

Food products and method of making same.

La Vine, L. 2,528,008, Oct. 31, 1950.

A method of preserving food, consisting in coating the food with a solution of calcium polysulfide, and then refrigerating the same.

PROCESSING

Dehumidifier for vending machines.

Sommer, P. L. 2,531,084, Nov. 21, 1950.

A moisture absorbing device for nut vending machine having cylindrical transparent containers open at their top and closed by a removable locking cap, the structure that includes a square flat plate having its corners rounded upon an arc that corresponds to the diameter of the open end of the container for resting support on the container beneath the locking cap, the plate provided centrally thereof with an opening for the passage of a retaining rod carried by the vending machine, an annular tubular ring fixed upon the bottom of the plate concentric thereto, the walls of the ring provided with a plurality of rows of perforations communicating with the interior of the ring, the plate provided with a plurality of rows of perforations communicating with the interior of the ring, a slight opening formed in the plate and having communication with the interior of the ring, a transparent disc arranged over the sight opening, means for preventing displacement of the disc, the ring adapted to house moisture absorbent crystals.

Method and apparatus for dehydration.

Roos, R. B., and Galvin, S. L. Assignors, by mesne assignments, to Thomas Lipton, Inc. 2,528,476, Oct. 31, 1950.

The process of dehydrating food or other hydrous substance which comprises freezing such substance and subjecting it in a confined space to a reduced water vapor pressure below that at the melting point of the substance, removing water vapor directly from space together with any other vapors and gases admixed therewith in space, heating the material being dried while it is subjected to reduced vapor pressure, and controlling the heat supplied to material in response to the pressure within space so that the heating is increased when the vapor pressure falls substantially below a predetermined value near but substantially less than the vapor pressure of substance at its melting point and is decreased when the vapor pressure rises to predetermined value.

Deep fat frying apparatus.

Pappas, P. M. 2,528,776, Nov. 7, 1950.

In an apparatus of the class described, the combination with a cabinet, of a hood fitted on cabinet, hood provided with a reinforced portion on its front, reinforced portion provided with a vertical opening opened at its top, hood provided with a horizontal slot near the middle of opening and with a horizontal slot near the top of opening, slots opening at their outer ends upon vertical opening, a movable lid on hood and normally closing the upper end of vertical opening, a basket in cabinet,

Abstracts

basket provided with a handle extending through vertical opening, handle being adapted to rest in horizontal slots, handle provided outside of hood with a fixed flange, flange normally bearing against the outer face of hood, and fixed flange when engaging the outer face of hood contiguous to either one of horizontal slots adapted to hold the basket in a steady horizontal position within the hood, substantially as shown and described.

ANNOUNCEMENT OF SAMUEL CATE PRESCOTT AWARD COMPETITION FOR STUDENT MEMBERS OF THE INSTITUTE OF FOOD TECHNOLOGISTS

An award of $100.00, designated as the SAMUEL CATE PRESCOTT AWARD, is to be made by the Northeast Section of the Institute of Food Technologists to the student presenting for this competition the best written account of a research project in the field of food technology.

Those eligible for the competition include all student members of the Institute of Food Technologists in good standing or persons who were formerly student members but who attained their bachelors' degrees no more than 12 months previously.

To be included in the present year, qualified competitors are required to submit their written reports in this competition to the Institute of Food Technologists, 176 West Adams St., Chicago 3, Illinois, previous to August 25, 1951.

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The Mexican Fisheries Industry

(Continued from page 19)

fishery is that for tunas, which are particularly prevalent in the high seas area surrounding the peninsula of Lower California. This fishery, however, cannot be considered Mexican, since no appreciable amounts are taken by Mexican fishermen. Vessels of California registry from the ports of San Diego and San Pedro, California, account for almost the entire take. Barracula, yellowtail, the jackfish inhabit much the same waters as the tuna and are likewise taken almost entirely by United States fishermen.

Mexico is at present attempting to expand its tuna industry from ports on the Gulf of California. The extent of the success of this enterprise will depend on the equipment used, the continued abundance of tuna, and the degree to which Mexico can develop its local and foreign markets.—Fishery Leaflet 339, from *Commercial Fisheries Review*, 12 (9), 74 (1950).

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REVIEW ON POLAROGRAPHIC ESTIMATION OF VITAMINS AVAILABLE

The current issues of "Scientific Apparatus and Methods," published by E. H. Sargent and Co., contain a survey of the theory, application and instrumentation of the polarographic determination of ascorbic acid, the tocopherols, the K vitamins, folic acid and miscellaneous other compounds. These articles appeared in the Spring and Fall issues (1950) of the quarterly and can be obtained gratis upon request from Bob Mitchell, E. H. Sargent and Co., Chicago 30, Illinois. Additional information on scientific instruments and equipment of interest to food technologists is also contained in this publication.

EMPLOYMENT NOTICES

WANTED: Food Technologist with chemical engineering background with some practical experience—age about 30. For quality control and development in dairy industry. Old established firm, excellent opportunity for advancement. REPLY BOX 134, Institute of Food Technologists, 176 W. Adams St., Chicago 3, Ill.

Wanted, Food Technologist for analytical determinations in starches, amino acids and vitamins. Familiar with use of spectrophotometer, colorimeter, polarimeter and fluorophotometer — contemplate use of flame photometer and Warburg apparatus—man or woman, prefer woman. Location Midwest. REPLY BOX 136, Institute of Food Technologists, 176 W. Adams St., Chicago 3, Ill.

WANTED, Junior Engineer, prefer man, 25-40, BS-ME required, 1 to 3 yrs. experience with demonstrated drafting and layout ability. Above average intellectual capacity with supervisory potential. REPLY BOX 135, Institute of Food Technologists, 176 W. Adams St., Chicago 3, Ill.

Wanted, Project Engineer, prefer man, 28-36, BS-ME essential with experience in machine and experimental design work and supervisory ability. Familiar with fabrication, machining and foundry practice, well informed on materials and standard component machine parts. REPLY BOX 135, Institute of Food Technologists, 176 W. Adams St., Chicago 3, Ill.

WANTED: Chemical Engineer. Large national firm in cereal field needs graduate chemical engineer with experience in food processing. Location in Minneapolis. Please state education and experience fully. REPLY BOX 138, Institute of Food Technologists, 176 W. Adams St., Chicago 3, Ill.

Wanted, Industrial Engineer, man, 26-33, ME or IE degree with 2-3 yrs. time study experience preferred to establish labor measurement standards, analyze operation by Micro-motion Analysis. REPLY BOX 135, Institute of Food Technologists, 176 W. Adams St., Chicago 3, Ill.

Wanted, Assistant to Advertising Service Manager, man, 26-35 yrs., college graduate preferred with 5 to 10 yrs. advertising experience with supervisory background. Above general ability, imaginative, personable, capacity for working on own initiative. REPLY BOX 135, Institute of Food Technologists, 176 W. Adams St., Chicago 3, Ill.

Wanted, Maintenance Foreman or Master Mechanic, 25-40, with college engineering work preferred. Maintenance experience including installation and repair of plant facilities and equipment with supervisory ability. REPLY BOX 135, Institute of Food Technologists, 176 W. Adams St., Chicago 3, Ill.

Wanted, Production Staff Assistant, man, 30-40, with college engineering or other technical degree, supervisory experience, preferably in slaughtering, sausage manufacturing or processing. Top level personality and administrative potential. REPLY BOX 135, Institute of Food Technologists, 176 W. Adams St., Chicago 3, Ill.

Wanted, Plant Engineer Administrative Assistant, man, 30-40 yrs., BS-ME or BS-EE preferred, with general experience or knowledge of power plant operation, refrigeration, construction, maintenance and industrial engineering. REPLY BOX 135, Institute of Food Technologists, 176 W. Adams St., Chicago 3, Ill.

Wanted, Mechanical Superintendent, 30-40 yrs., BS-ME preferred with engineering experience in power plant operation, maintenance and construction required and with capacity for directing and organizing new construction program. REPLY BOX 135, Institute of Food Technologists, 176 W. Adams St., Chicago 3, Ill.

Wanted, Materials Handling Engineer, 30-45 BS-MS or BS-IE preferred with minimum 2 yrs. college engineering training with experience in materials handling and time study work. REPLY BOX 135, Institute of Food Technologists, 176 W. Adams St., Chicago 3, Ill.

Wanted, Employment Manager, 22-35 yrs., college degree essential with major field preferably in Psychology, Personnel Administration or Industrial Management. Above average general ability and supervisory potential with good appearance and personality makeup suitable for personnel work. REPLY BOX 135, Institute of Food Technologists, 176 W. Adams St., Chicago 3, Ill.

WANTED: Food Technologist for research and development with large coffee roaster and manufacturer of salad dressings, soup mixes, syrups and macaroni products in Chicago. Give training, experience, references and salary expected. REPLY BOX 139, Institute of Food Technologists, 176 W. Adams Street, Chicago 3, Ill.

Wanted, Personnel Assistant, man, 22-28 yrs., college degree essential with major field preferably in Psychology, Personnel Administration or Industrial Management. Able to type and some experience in personnel office preferred. Good appearance and personality makeup suitable for personnel work. REPLY BOX 133, Institute of Food Technologists, 176 W. Adams St., Chicago 3, Ill.

Chemical Engineer, 25, married, with 2 years quality control experience with food processor desires permanent position with food packer. Reply Food Technology, Box 62, 360 N. Michigan Avenue, Chicago 1.

Available, Food Technologist, Ph.D., 12 yrs. experience in foods and beverages; laboratory supervision, independent research, development and quality control; brewing materials, bakery supplies, foods; salad dressings, cereals, preserves, confections, flavor emulsions, desserts; packaging of food products, product evaluation and technical consultation. Reply Box 133, Institute of Food Technologists, 176 W. Adams St., Chicago 3, Illinois.

POSITION WANTED: Food Technologist, administrative, Ph.D. biochemistry, 20 years experience canning, freezing, and formulated products, desires position, research or technical representative. REPLY BOX 137, Institute of Food Technologists, 176 W. Adams St., Chicago 3, Ill.

Position Wanted, Food Technologist, technical and administrative background, wants position in production or related. 13 yrs. varied experience in product development, quality control, production, etc. on canned goods, specialties, spreads and jellies, other items. Available reasonable notice. REPLY BOX 140, Institute of Food Technologists, 176 W. Adams St., Chicago 3, Ill.

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FUTURE DATES FOR FOOD TECHNOLOGISTS

1951

April 16	Packaging Machinery Manufacturers Institute. Hotel Dennis, Atlantic City, N. J.
April 16-18	American Dry Milk Institute, Inc. Edgewater Beach Hotel, Chicago, Ill.
April 22-26	American Society of Brewing Chemists. Annual Meeting. Edgewater Beach Hotel, Chicago, Ill.
May 2	National Cheese Institute, Inc. LaSalle Hotel, Chicago, Ill.
May 7-8	Associates, Food and Container Institute. Annual Meeting. Mayflower Hotel, Washington, D. C.
June 3-7	National Confectioners Association. Stevens Hotel, Chicago, Ill.
June 5	American Association of Candy Technologists. Annual Meeting. Stevens Hotel, Chicago, Ill.
June 5-18	International Food Exposition. Chicago, Ill.
June 17-20.	**Institute of Food Technologists. Eleventh Annual Meeting. Hotel New Yorker, New York, N. Y.**
August	World Poultry Science Association. Ninth Congress. Paris.
Aug. 2-Sept. 11	Eighth International Congress of Refrigeration. London.
Aug. 6-10	Food and Nutrition Sessions, Gordon Research Conference, AAAS. Colby Junior College, New London, N. H.
Sept. 8-13	XIIth International Congress of Pure and Applied Chemistry. New York, N. Y.
Sept. 26-29	International Association of Milk and Food Sanitarians. Glenwood Springs, Colo.
September	FAO Meeting on Herring Technology. Bergen, Norway.
October	International Association of Ice Cream Manufacturers. Detroit, Mich.
October	International Canning Conference. Paris.
Oct. 1-3	Association of Official Agricultural Chemists. Shoreham Hotel, Washington, D. C.
Nov. 5-8	Refrigeration and Air Conditioning Exposition, Navy Pier, Chicago, Ill.
Nov. 12-15	American Bottlers of Carbonated Beverages. Annual Meeting. Armory, Washington, D. C.

(Information concerning future dates of national and international meetings, conventions and exhibits of interest to food technologists should be sent to the editorial office.)

SUBJECTS OF INTEREST TO FOOD TECHNOLOGISTS ON PROGRAM OF FOOD AND NUTRITION SESSIONS OF THE GORDON RESEARCH CONFERENCES, AAAS

The Food and Nutrition Session of the 1951 Gordon Research Conferences will be held at Colby Junior College at New London, N. H., during August 6-10. The program contains several subjects of interest to food technologists. Some of these are: Antibiotics in food preservation; Antibiotics as nutrients; Therapeutic nutrition; Marine nutrition; Chemistry and metabolism of polysaccharides; and Geriatric nutrition. Every subject will be taken up during a morning or evening session with two invited speakers starting the discussion. There are no afternoon meetings. Applications for attendance should be addressed to Dr. W. George Parks, Chemistry Department, Rhode Island State College, Kingston, R. I., before June 1. The attendance is limited to about 100 participants.

FOOD TECHNOLOGY

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EDITOR

Z. I. KERTESZ

Division of Food Science and Technology
New York State Agricultural Experiment Station
Geneva, New York

Editor Emeritus

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News of the Institute

PROGRAM COMMITTEE FOR THE 1952 ANNUAL MEETING OF THE I. F. T. ANNOUNCED

The following committee was appointed to be in charge of the program at the 1952 (Grand Rapids, Michigan) Meeting of the I. F. T.: Roy E. Marshall, Chairman; L. E. Clifcorn, A. L. Elder, Ira D. Garard, C. G. Harrel, E. W. Hopkins, R. A. Isker, H. S. Mitchell, E. M. Mrak, Carl S. Pederson, A. N. Prater, B. E. Proctor, George F. Stewart, J. G. Woodroof.

PERSONNEL

WALTER C. HANSEN, formerly Laboratory Director, Morton Salt Co., Chicago, Ill., has been appointed Technical Director for James B. Long & Co., Chicago.

MAYNARD A. JOSLYN, Associate Professor, Food Technology Division, University of California, Berkeley (and an Associate Editor of Food Research), recently left for Israel where he will do research on yeast at the Weizmann Institute. He will attend the International Canning Conference in Paris, France, this month and in May will attend a meeting of the Mediterranean Citrus Chemists in Spain. He plans to visit Belgium, Norway, France, Switzerland, and in England will attend a meeting of the International Institut du Froid at the request of the British Government. At this latter meeting, he will preside at a section meeting on enzyme chemistry and also present a paper.

EMIL M. MRAK, Professor and Chairman, Food Technology Division and Mycologist in the Experimental Station, University of California, Berkeley, recently made a quick trip to England to attend a meeting called to discuss the combat feeding for the Armed Services and Defense feeding for civilians of England and the United States. At the meetings which were held in London, the following subjects were discussed: (1) observers' reports on World War II, (2) relation of stress to nutritional requirements, (3) methods of determining nutritional status, (4) factors determining acceptability and continuing acceptance, (5) relation of processing (food technology) to the above factors.

SAMUEL LEPKOVSKY, Poultry Division, University of California, Berkeley, was also present at the London meeting with Professor Mrak.

ERNEST S. STATELER, Associate Editor of *Food Industries* and a staunch member of the I. F. T. and of its Chicago Section, has been appointed a member of the Consulting Staff of the Wahl-Henius Institute of Chicago, Ill. Before becoming associated with *Food Industries*, Mr. Stateler had wide experience in the fields of chemical and food technology at state, federal and commercial organizations. Here are our best wishes for success and satisfaction.

GEORGE F. STEWART, formerly Associate Director, Agricultural Experiment Station, Iowa State College, Ames (and an Associate Editor of *Food Technology*), has been appointed Professor of Poultry Husbandry and Chairman of that Division for the University of California at Davis. This completes a briefer report which appeared in March *Food Technology*.

Regional Section News

PHILADELPHIA SECTION

The Section held its March meeting on the first of that month in the Men's Faculty Club of the Drexel Institute of Technology. Mr. Carl D. Pratt, Director Technical Division, Industrial Chemical Department, Atlas Powder Company, Wilmington, Delaware, was the guest speaker. His topic was "The Use of Emulsifiers in Foods."

NORTHERN CALIFORNIA SECTION

At the February meeting 135 members and guests heard Mr. A. L. Baiette speak on "The Atomic Bomb and its Effect on Food and Human." Mr. Baiette is Associate Chief, Health Physics Branch, U. S. Naval Radiological Defense Laboratory, Hunter's Point, San Francisco. He presented a general introduction which included a description of the work of a Health Physicist, elementary atomic theory, and types of radiation. He also described internal and external effects of radiation stressing that the ingestion of minutely contaminated food would have the most serious effects. Factors in determining the amount of contamination include: (1) nature of attack, (2) distance from the center, (3) chemical composition of the container, (4) type of package, and (5) place of storage.

Mr. Baiette differentiated between induced radioactivity and contamination, pointing out the latter can be cleaned off the outside of a container and is therefore not as serious as the former. He closed his talk with a discussion on decontamination.

AMES SECTION

The first meeting of the 1950-51 season was an afternoon and evening session held in the Pine Room in the Memorial Union. In the afternoon the members enjoyed an excellent symposium: "Insect and Rodent Control in Food Plants and Food Products." Talks were given by:

E. W. Eickelberg, Fairmont Canning Company, Fairmont, Minnesota. "Insects and Rodents as Problems in the Canning Industry."

Harold Gunderson, Extension Entomologist, Iowa State College. "Insect and Rodent Control as seen by an Extension Worker."

Chester T. Hubble, Food and Drug Administrator, Minneapolis, Minn. "Regulatory and Legal Aspects of Insect and Rodent Control."

A. W. Price, W. B. McCloud & Company, Chicago, Illinois. "Description of the Services offered by Pest Companies."

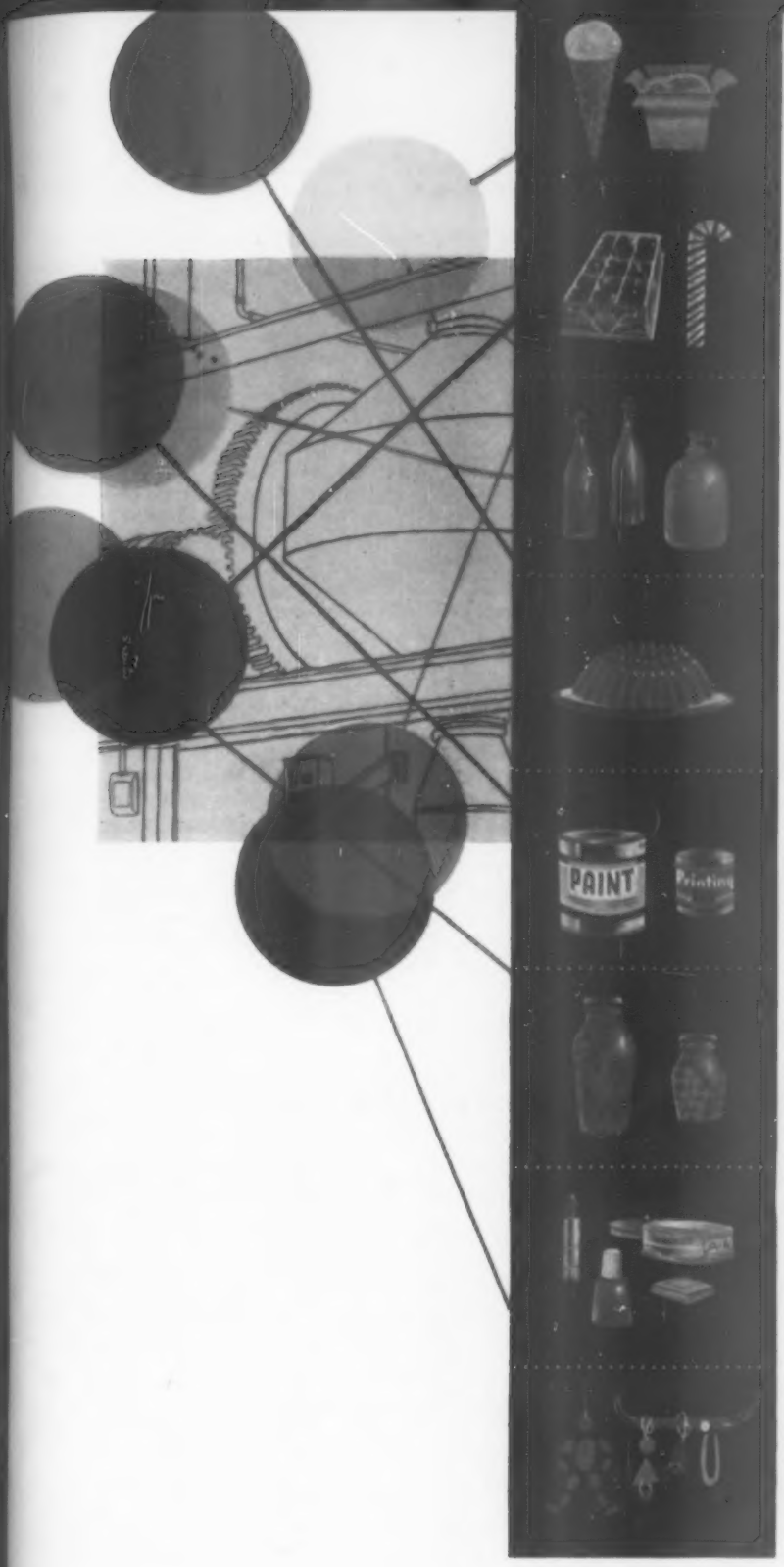
R. G. Tischer, Horticulture Department, Iowa State College. "Insect Contamination of Canned Corn."

In the evening Miss Ellen Pennell of the Journalism Department of Iowa State College gave a most interesting talk on "Techniques of Food Advertising."

GREAT LAKES SECTION

The Spring Meeting will be held on April 20 at Nela Park, the headquarters of General Electric Laboratories,

(Continued on page 18 following technical papers)



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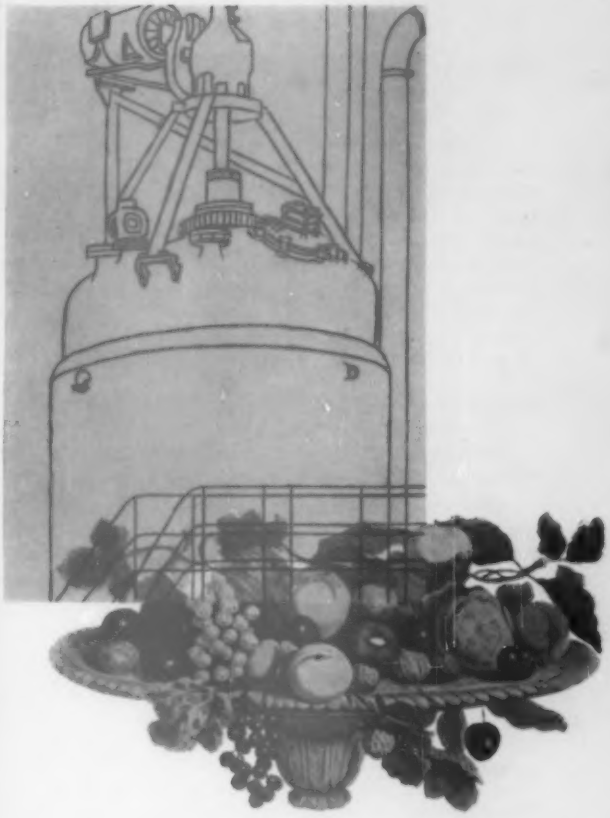

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Selected Abstracts

ANALYTICAL METHODS

Quantitative paper chromatography. I. Separation and gravimetric determination of thallium.

ANDERSON, J. R. A., AND LEDERER, M. *Anal. Chim. Acta., 4,* 513-16 (1950).

Separation and gravimetric determination of thallium. Using butanol saturated with NH_4Cl as solvent, trivalent thallium can be separated quantitatively from Fe, Cu, Ni and Co by a new technic of paper chromatography which employs strips of paper pulp.

An improved method of detecting sugars on paper chromatograms.

NOVELLE, L. Nature, *166,* 745-6 (1950).

Detection of sugars on paper chromatogram by use of β-naphthylamine spray. Fructose gives a bright yellow spot, pentoses give pink-red spots and aldohexoses give light brown spots.

Estimation of reducing sugars in starch hydrolyzates by paper chromatography.

SHU, P. *Canadian J. Research, 28B,* 527-34 (1950).

A method for quantitative determination of glucose, maltose, and reducing dextrins in starch hydrolyzates is described. The components are separated by paper chromatography and determined colorimetrically by measurement of their reducing power with alkaline copper and arseno-molybdate reagents. The probable error of the determinations with the use of this method is about 2%. A compact apparatus was designed, suitable for handling a large number of samples in the chromatographic separation. It is particularly useful for compounds with low R_f values.

Separation of starch and gluten. V. Problems in wheat starch manufacture arising from flour pentosans.

CLENDENNING, K. A., AND WRIGHT, D. E. *Canadian J. Research, 28F,* 390-400 (1950).

The voluminous starch sludge or "squeegee" fraction, obtained with all known methods of wheat starch manufacture, consists of strongly hydrated pentosan masses in which starch granules are embedded. The pentosans of the bran and endosperm both contribute to the formation of these heterogeneous complexes. The "squeegee" starch fraction is not abolished by allowing the crude starch slurries to ferment, by exposing them briefly to mildly acid or alkaline solutions, or to C_8-C_{13} monohydric alcohols. The pentosan and protein contents of this low quality starch fraction may be greatly reduced by 24-48 hr. digestion in dilute acid at pH 2.0 before recovering the starch on the centrifuge.

Determination of starch and amylose in vegetables. Application to peas.

MCCREADY, R. M., GUGGOLZ, J., SILVIERA, V., OWENS, H. S. *Anal. Chem., 22,* 1156-8 (1950).

Sugars are extracted from peas with 80% ethyl alcohol and the starch is solubilized with diluted perchloric acid. Starch is then determined colorimetrically, without previous acid hydrolysis, by means of the sugar-anthrone-sulfuric acid reaction. Amylose is estimated colorimetrically with iodine. Both total starch and amylose can be determined in about 30 minutes in sugar-free solutions. The accuracy and precision are at least equal to those of standard methods involving acid hydrolysis. Analyses of smooth and wrinkled dried peas and fresh peas are presented.

Soluble carbohydrates of fruit plants.

BRADFIELD, A. E., AND FLOOD, A. E. *Nature, 166,* 264-5 (1950).

Soluble carbohydrates of apple and plum plants have been under investigation using paper chromatography as a method. The soluble carbohydrate fraction contained fructose, glucose, sucrose, sorbitol and also raffiinose and stachyose.

Limits of the detection of glycols in glycerol by the method of Kroller.

NEU, R. *Pharmazie, 5,* 217-18 (1950).; *J. Am. Oil Chemists Soc., 27,* 428 (1950).

The lower limits for the detection of glycols in glycerol are: ethylene glycol, 0.4%; 1, 2-propylene glycol, 1.2%, 1, 4-butylene glycol, 2%. The reaction can probably also be used for 1, 3-trimethylene glycol.

Microbiological determination of sulfur in yeast.

MCMANUS, D. K., SCHULTZ, A. S., AND MAYNARD, W. E. *Anal. Chem., 22,* 1187-90 (1950). A microbiological assay method for the determination of total sulfur in yeast is described in which *Torula utilis* is the test organism and methionine is the reference standard for sulfur. The microbiological assay results on yeast are compared with results from four known chemical methods. The method may be applicable to other substances. Results on whole soybean flour, defatted soybean flour, and vitamin-free casein indicate that the selection of the reference standard is important.

Copper contamination and ascorbic acid loss in Waring Blendor.

LAMDEN, M. P. *Anal. Chem., 22,* 1139-41 (1950).

The Waring Blendor, which has extensive usage in food analysis, vitamin assays, and biochemical preparations, is regarded with disfavor by some workers. Loss in ascorbic acid and loss in enzyme activity during blending have been cited. Adverse results may arise from use of containers having worn chrome plating on their blending assemblies. Copper dissolving from exposed brass parts may catalyze the loss of ascorbic acid in solutions during blending or create false high results in the determination of the copper content of certain foodstuffs. Inhibition of the destructive effect of copper dissolved from the blending assembly on ascorbic acid is discussed.

BIOLOGICAL SCIENCES

BIOCHEMISTRY

Effects of vitamin B_{12} on thiouracil action in rats.

MEITES, J. *Proc. Soc. Exptl. Biol. Med., 75,* 193-5 (1950).

The effects of crystalline vitamin B_{12} on thiouracil action was determined in immature female rats for a 30-day period. The vitamin completely counteracted the growth-inhibiting action of thiouracil, and this was accompanied by a considerable increase in food consumption. Although vitamin B_{12} decreased the thyroid hypertrophy induced by thiouracil, the uptake of radioactive iodine (I^{131}) by the thyroids was even less than in the rats which received thiouracil only. It is suggested that vitamin B_{12} may be able to induce normal growth in hypothyroid rats.

Vitamin B_{12}. I. The relation between vitamins B_{12} and B_{12b}.

VEER, W. L. C., EDELHAUSEN, J. H., WIJMENGA, H. G., AND LENS, G. *Biochim. Biophys. Acta., 6,* 225-8 (1950).

In mildly acid solutions, kept in the dark, the spectrum of vitamin B_{12} remains unchanged; on exposure to light, vitamin B_{12b} is rapidly formed. The spectrum of an irradiated solution, ($pH \geq 4$), subsequently kept in the dark, shows a slow reversal to that of vitamin B_{12}. When KCN is added to a solution of vitamin B_{12b}, rapid shift in the spectrum, from vitamin B_{12b} to vitamin B_{12}, can be observed.

Effects of vitamin B_{12} on normal thyroid function in rats.

MEITES, J. *Proc. Soc. Exptl. Biol. Med., 75,* 195-7 (1950).

Crystalline vitamin B_{12} was fed to immature rats of both sexes in order to determine whether the vitamin could alter thyroid function in normal or thyro-protein-treated rats. The growth rate of the rats supplemented with the vitamin was increased above that of the normal or thyroprotein-treated controls, but there was no significant effect on thyroid weight or uptake of I^{131}. It is concluded that vitamin B_{12} does not alter normal thyroid activity in rats.

NUTRITION

Sex differences in weight-stimulating effect of B_{12} in rats on diets of varying composition.

McCollum, E. B., and Chow, B. F. *Proc. Soc. Exptl. Biol. Med., 75,* 20-3 (1950).

Administration of B_{12} to rats from B_{12} depleted mothers produced increases in weight gains in both sexes on all of the rations studied. When the calories are derived primarily from carbohydrate, the vitamin exerts a greater effect on the weight gain in young female rats than in their littermate males. The stimulating effect of B_{12} was more marked in females on high carbohydrate diets than in littermate sisters on like diets except that fat replaces part or all of the carbohydrate.

Cobalt in the nutrition of sheep.

Keener, Percival, G. P., Ellis, G. H., and Beeson, K. C. *J. An. Sci., 9,* 404 (1950); *Vet. Med., 45,* 406 (1950).

An experiment was carried out with sheep in an attempt to learn more about the role of cobalt in the nutrition of ruminants. Every animal on the cobalt deficient diet developed marked symptoms. Those receiving cobalt supplements remained healthy. Those animals on a cobalt supplement gained 7 times as much weight. It was found both cobalt sulfate and cobalt carbonate relieved the deficiency when administered orally.

ENGINEERING

Fermentation. (Part of chemical engineering unit process review.)

Lee, S. B. *Ind. Eng. Chem., 42,* 1672-87 (1950).

A quick resume of the field with 333 references are included covering alcohols, microbiological amylases, acetone and butyl alcohol, 2, 3-butanediol, citric, lactic and other organic acids. Microbiological production of vitamins such as riboflavin, yeast production and antibiotics (penicillin, streptomycin, chloromycetin, aureomycin, bacitracin, neomycin, polymyxin, subtilin, tyrothricin, and terramycin). The growth of the proper microorganism, substrates, trace materials (particularly inhibitory effects) sterilization, fermentation equipment and the actual fermentation are treated as unit process factors.

FOOD PRODUCTS

FLAVORS

Vanillas as antioxidants in powdered ice cream mixes.

Pyenson, H., and Tracy, P. H. *J. Dairy Sci., 23,* 815-19 (1950).

Studies were made of nine vanillas and four vanilla compounds in powdered ice cream mixes held for one year at room temperature. The products used represented five different manufacturers of vanillas or vanilla compounds. Changes in the oxygen concentration of the headspace gas and palatability studies indicated that these vanillas and vanilla compounds have antioxygenic properties in powdered ice cream mixes. The addition of these vanillas or possibly the vanilla compounds would serve a two-fold purpose in powdered ice cream mixes, i.e., as flavoring and as an antioxidant.

FRUIT AND FRUIT JUICES

The retention of ascorbic acid in preserved fruits. II.

Crang, A., and Sturdy, M. *J. Sci. Food Agric., 1,* 252-4 (1950).

Further comparisons of domestic methods of preserving fruits have been made. The ascorbic acid retained in freshly-made jam from the three kinds of fruit was greatest in blackcurrant (70%), next in gooseberry (66%) and least in strawberry (55%), and after storage for one year the amounts were 30%, 28% and 17% respectively. The absolute values for ascorbic acid after one year's storage were approximately 6 mg./100 g. both for strawberry and gooseberry jams and 25 mg./100 g. for blackcurrant jam. The loss of this vitamin in making blackcurrant jelly varied considerably with the extraction methods used but was greater than in making jam. The ascorbic acid contents, before and after cooking, of three kinds of fruit preserved with sodium metabisulphite were compared with those of corresponding heat-processed fruits. The heat-processed

(Continued on page 16)

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Institute of Food Technologists Eleventh Annual Meeting

JUNE 17-21, 1951

Courtesy New York Convention and Visitors Bureau

Program: The full program of the eleventh annual meeting of the Institute of Food Technologists to be held in New York, June 17-21, 1951, will be published in the next (May) issue of FOOD TECHNOLOGY. Abstracts of all papers will be included. Thus for the first time the Institute's official publication will carry a complete record of the abstracts of papers in advance of presentation.

Assisting Dr. Charles N. Frey and his Program Committee in the organization of the technical part of the program has been a group of prominent members of the Institute of Food Technologists, each of whom has accepted responsibilities for a specific group of papers. These names, and their respective topics, follow: R. T. Bohn on Cereal Technology; B. S. Clark on Modern Tinplate and its Use in Packaging Food Products; L. E. Clifcorn on Food Technology and the Food Industry; A. L. Elder on Instrumentation and Control Methods in Food Processing; C. R. Fellers on Fish Products; G. Garnatz on Consumer Acceptance Testing; D. B. Hand on Low Temperature Evaporation of Food Products; R. A. Isker on Military Subsistence; M. B. Jacobs on Flavor; H. R. Kraybill on Recent Developments in the Meat Industry; A. G. Olsen on Plant Control Methods. Product Protection. Life Expectancy of the Product; B. L. Oser on Sanitation and Chemicals in Foods; M. E. Pennington on The Transportation of Foods; B. E. Proctor on Food Preservation; E. H. Wiegand on Frozen Foods.

Exhibits: Industrial exhibits prepared by about fifty major companies offering products, processes, and services to the food industry will be installed on the mezzanine floor of the Hotel New Yorker for the period of the meeting. More than 50 exhibit booths have been set aside in the north ballroom and adjacent areas on the mezzanine floor adjoining the main ballroom, where scientific sessions will be held.

The exhibition rooms will be open for inspection by food technologists on Sunday afternoon, June 17th. On the next 3 days, exhibits will be open from 8:30 A. M. to 7:00 P. M. This will give ample opportunity for the

food technologists to visit exhibits without conflicting with the technical sessions. The exhibitors include companies supplying chemicals, vitamins, flavors, sugars, starch and numerous other food ingredients, also companies supplying processes, processing equipment, control equipment and laboratory testing devices. A complete list of exhibitors with booth locations will be included in the official program.

Here will be the opportunity for food technologists to see products, processes, and equipment offered by important suppliers to the food industry.

To the Ladies: Pray for good weather on Monday, June 18th, when the women's program under the capable leadership of Ruth R. Bien, Chairman of the Guest Committee starts off with a luncheon and fashion show at one of New York's most unique restaurants—the Tavern on the Green, in Central Park. Of course, we'll have the party, rain or shine, but we're hoping for a perfect June day, so we can enjoy a pre-luncheon get-together on the out-door terrace. Then lunch, followed by Margaret Newman's latest in summer clothes and play clothes. There'll be time then for a quick look at the Zoo, or a bit of window shopping on Fifth Avenue before prettying up for our Big Event—a theater party —on Monday evening. Tuesday and Wednesday there will be trips through Radio City, the United Nations, and Good Housekeeping's Service Laboratories. And, steamship schedules permitting, an inspection of one of the big luxury liners. All the radio and television broadcasts that you want, too. We're arranging the program with plenty of free time for shopping, exploring the city, or whatever else your fancy dictates. A complete package of information on shops, restaurants and other high spots will be waiting for each one, and the committe will be ready and waiting to see that everyone has the best time possible.

Reservations: If you have not already sent in your hotel reservation, now is the time to do so. A reservation coupon was printed in the March issue of FOOD TECHNOLOGY. This may be sent directly to the Hotel New Yorker where we are assured of a sufficient number of accommodations for all who will apply.

ANNOUNCEMENT OF SAMUEL CATE PRESCOTT AWARD COMPETITION FOR STUDENT MEMBERS OF THE INSTITUTE OF FOOD TECHNOLOGISTS

An award of $100.00, designated as the SAMUEL CATE PRESCOTT AWARD, is to be made by the Northeast Section of the Institute of Food Technologists to the student presenting for this competition the best written account of a research project in the field of food technology.

Those eligible for the competition include all student members of the Institute of Food Technologists in good standing or persons who were formerly student members but who attained their bachelors' degrees no more than 12 months previously.

To be included in the present year, qualified competitors are required to submit their written reports in this competition to the Institute of Food Technologists, 176 West Adams St., Chicago 3, Illinois, previous to August 25, 1951.

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Abstracts

(Continued from page 13)

blackcurrants and gooseberries retained more of this vitamin than the sulphited fruit; the palatability of the heat-processed products was greater for all three fruits.

Citrus products and the future.

MCCRACKEN, W. K. *California Citrograph, 35,* 266-7 (1950); *Biol. Abst., 24,* 2474, No. 26420 (1950).

A discussion of charts of Florida orange production, average price per box of Florida oranges, disposition of California Valencias shipped fresh and processed, percent of families buying fresh oranges, canned orange juice and frozen concentrate, consumer purchases of canned juices (orange, tomato, grapefruit), comparative selling price of frozen concentrated and canned orange juice, and sales of Valencia oranges on auction market. Future prospects of various products are given and comments made on methods to improve returns to growers and processors.

PECTIN

The specificity of pectinesterases from several sources with some notes on purification of orange pectinesterase.

MACDONNELL, L. R., JONG, R., JANSEN, J. E., AND LINEWEAVER, H. *Arch. Biochem., 28,* 260-73 (1950).

Orange pectinesterase (PE) is highly specific. It hydrolyzes pectins at least 1000 times as fast as it does any of some 50 non-galacturonic esters tested. Crude preparations of alfalfa, tomato and fungal PE hydrolyzes pectin at least 60 times as fast as they do any substrates except phenyl acetate and phenyl propionate. It appears that the polygalacturonate structure is essential for PE activity. However, the esterase that acts on pectin is not restricted to methyl esters.

PATENTS

BAKING AND BAKERY PRODUCTS

Preparation of cakes with liquid oil.

TREMPEL, L. G., AND FRINK, M. E. Assignors to A. E. Staley Manuf. Co. 2,532,523, Dec. 5, 1950.

In the preparation of cakes wherein the batter ingredients include liquid triglyceride oil as the shortening agent and glycerol monostearate as an emulsifying agent the improvement comprising: mixing together and heating oil and monostearate to form a solution and mixing solution, at a temperature of at least about 120° F., with the other batter ingredients; monostearate being present at a concentration of 4 to 6% based on the weight of the oil.

Pyrophosphate baking powder.

BARCH, W. E. Assignor to Standard Brands Inc. 2,532,281, Dec. 5, 1950.

A pyrophosphate baking powder having improved keeping qualities wherein the filler comprises calcium carbonate in an amount between about 7% and about 75% of the total weight of the filler.

COFFEE AND CHOCOLATE

Packaged coffee.

ABRAHAMS, L. H. Assignor to Koffy-Pak Corp. 2,531,594, Nov. 28, 1950.

An article for use in brewing coffee comprising a sealed bag containing ground coffee, bag comprising a non-woven fabric of viscose fibers bound together by cellulose regenerated from viscose and having pores of lesser size than the meshes of a Tyler 100-mesh standard sieve, some of pores being of greater size than the meshes of a Tyler 300-mesh standard sieve.

Method of and apparatus for conditioning chocolate and the like.

28, 1950.

In an apparatus for cooling melted chocolate, the combination of a plurality of receptacles positioned one above another in vertically spaced relationship, the upper receptacles having parts for guiding small streams of chocolate flowing

from it into positions where they will fall by gravity directly into the receptacles below it through the intervening air space separating receptacles, means for circulating cooling air around and in contact with free falling streams, and means for maintaining the chocolate in receptacles within substantially predetermined temperature limits at which it flows freely, temperature maintaining means including water jackets for receptacles.

ENRICHMENT

Vitamin-enriched products and process of producing same.

JORDAN, J. W. Assignor to National Lead Co. 2,531,439, Nov. 28, 1950.

A composition for the treatment of food products, comprising a modified clay initially exhibiting substantial base-exchange capacity, in which the clay cation has been substantially replaced by a substituted cation of a vitamin by reacting 10-100 milliequivalents of the vitamin with 100 grams of the clay, but in order to retain substantially the adhesive character of the clay, the vitamin being of a class consisting of thiamin, niacin and riboflavin.

FATS AND OILS

Treatment of unrendered fat with nordihydroguaiaretic acid.

FONYO, A. Assignor to W. J. Stange Co. 2,535,910, Dec. 26, 1950.

The method of processing unrendered fats to afford them resistance to oxidative rancidity which consists in introducing into an aqueous vehicle nordihydroguaiaretic acid in a solvent therefor taken from the group which consists of sorbitan monolaurate, -palmitate, -stearate, -oleate and their polyoxyalkylene derivatives, and polyethylene glycol mono-oleate, -dioleate, -monostearate, -distearate, and contacting with the resultant aqueous solution exposed surfaces of uncomminuted meat bodies in which such fats occur.

FRUIT, FRUIT JUICES AND VEGETABLES

Treatment of fruits and vegetables.

PRYOR, D. E., AND BAKER, J. C. Assignors to Wallace & Tiernan Products Corp. 2,531,463, Nov. 28, 1950.

In the treatment of fresh fruits and vegetables to inhibit bacterial and fungal decay, the improvements which comprise washing the surface thereof in an aqueous solution containing from about 10 to 400 p.p.m. of total chlorine, less than 50% of the total chlorine being present in the form of free chlorine and the remainder of the total chlorine being present in the form of an N-chloro amine.

Citrus fruit juicer.

POLK, SR., R., AND POLK, JR., R. Assignors to The Polk Development Co. 2,533,139, Dec. 5, 1950.

In a citrus fruit juicer, a rotary grate comprising a series of juxtaposed and axially spaced circular discs forming a grate for engaging the cut surface of fruit segments, rotary pressure means having a circular periphery for engaging the outer peel surface of the segments and arranged with respect to the peripheries of discs to form a constricted throat, means for rotating the grate and pressure means in directions to propel the fruit segments through throat and press pulp of the segments into the spaces between discs, the spacing between the discs being sufficient to admit the pulp without substantial juice cell rupture thereof, and other pressure means having portions in spaces adjacent throat fixed relatively to the propelled segments to engage pulp and remove juice bearing pulp from the peel of the segments, series of discs as a group being axially arched to form an arched grate, the diameter and arching of the grate being such that when the skins of fruit segments are pressed thereon the natural curvature of the skin will not be deformed to a skin rupture.

Process of removing oil from citrus fruit juices.

CROSS, J. A. Assignor to Mojonnier Bros. Co. 2,534,341, Dec. 19, 1950.

A method of treating citrus juice which comprises: supplying heat to a flowing stream of freshly extracted citrus juice,

(Continued on page 20)

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Regional Section News

(Continued from page 8 preceding technical papers)

in Cleveland, Ohio. Applications of electricity in food processing and preservation will provide one of the most interesting meetings this Section has ever had, it is anticipated. Members who attend this meeting will be given all the shrimp they can eat by Karl C. Envoldsen, president of Envoldsen Shrimp, Inc., better known as the Shrimp King, and member of the committee in charge of the Cleveland meeting. Dr. Harry O. Way, Director, H. O. Way Laboratory Service, will chair the meeting. His committee consists of Mr. Envoldsen, W. L. Thompson and J. C. Sanford. The latter is Technical Director, Basic Food Materials, Inc., Vermilion, Ohio.

Ray B. Wakefield, Director of Research, Gerber Products Co., Freemont, Mich., who is Chairman of the 1952 National Convention to be held in Grand Rapids, Mich., reports that his various committee chairmen have been appointed and that initial plans are well under way for the convention.

DIXIE SECTION

While the March issue of *Food Technology* made reference to this Section's March 16th meeting in Knoxville, Tenn., at which Mr. Arthur Downey, Vice President in Charge of Research for Magnus, Mabee and Reynard, Inc., was guest speaker, the following brief report on their February 2nd meeting has been received since our last "going to press." Mr. E. S. Papy, General Manager of the White Provision Company, Atlanta, Georgia, was guest speaker, taking as his subject: "What About Meats?" Since the definite trend in the South is toward the production and processing of livestock, Mr. Papy's talk provoked considerable interest with food technologists throughout the southeastern states. Preceding the meeting, an inspection trip was made of the plant and facilities of the White Provision Company.

NORTHEAST SECTION

Both the February and March meetings were held in the Patten Restaurant in Boston; the former on February 10, the latter, March 1st.

Mr. Joseph Puncochar, Chief, U. S. Fish and Wildlife Service, Fishery Technological Laboratory, East Boston, Mass., addressed the February meeting on the Fish and Wildlife Service project, "Freezing Fish at Sea." The research and development program, which will be under the direction of Mr. Puncochar, will include the actual taking and freezing at sea (in the "round") of various species of North Atlantic fish on their own trawler. Shore operations will be concerned with the development of practical methods for the defrosting and preparation of these fish for the market, he said, and also the utilization of the viscera and fish waste for by-products. If successful, he concluded, the project should revolutionize the industry and provide numerous benefits to boat operators, plant operators and consumers alike. Mr. Stanley Hurley, Quality Control Director, Gorton-Pew Fisheries Company, Limited, Gloucester, Mass., also addressed the February meeting.

(Continued on page 22)

Book Review

OFFICIAL METHODS OF ANALYSES OF THE ASSOCIATION OF OFFICIAL AGRICULTURAL CHEMISTS. Seventh Edition. Henry A. Lepper, Chairman of the Editorial Board. 901 pp. Published by the Association of Official Agricultural Chemists, Washington, D. C., 1950. Price, $10.00.

The Seventh Edition of Official Methods of Analysis, A. O. A. C. needs no introduction to chemical analysts the world over. This latest edition includes those methods sponsored by the Association up to and including those adopted at its 1949 meeting. Like the earlier ones, this is not a text on analytical procedures but is a compilation of collaboratively tested methods, a necessary working tool wherever the analyses of drugs and agricultural or related products are performed.

The identification of each method by both the number of the chapter in which it is found and its specific decimal number, so successful in the Sixth Edition, has been retained.

All methods are designated as either "official" or as "first action." The "tentative" designation of previous editions has been dropped and substituted for it is "first action." This new designation will avoid a great deal of misunderstanding since many who were not familiar with the Association's procedure of method adoption thought that a "tentative" method was one which had not necessarily been tested collaboratively.

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Abstracts

(Continued from page 17)

passing the heated citrus juice into a flash chamber maintained at a subatmospheric pressure to vaporize oily constituents and some water therefrom, condensing the oily constituents and water, gravitationally separating the condensed oily constituents and water, separately withdrawing the oily constituents and mixing the separated water with substantially oil-free citrus juice discharged from the flash chamber.

Method of and apparatus for steaming vegetables.

WILBUR, P. C. Assignor to Food Machinery and Chemical Corp. 2,534,648, Dec. 19, 1950.

The method of steaming fresh whole vegetables to loosen their skins to facilitate peeling thereof, comprising the steps of maintaining a confined body of steam at constant pressure within a closed chamber substantially sealed from the atmosphere, constantly introducing vegetables into chamber by a series of successive increments, continuously advancing vegetables through chamber in a series of relatively shallow groupings thereof while constantly tumbling vegetables relative to each other to subject all portions of the outer surfaces of all the vegetables in chamber to uniform treatment by steam, continuously discharging the steam treated vegetables from chamber by a series of successive decrements as vegetables conclude their passage through chamber, and controlling the speed at which vegetables are advanced through chamber whereby the exposure of vegetables to steam in chamber produces only that minimum degree of cooking of the outer layer of vegetables which is necessary to facilitate the ready removal of the skin therefrom.

GELS

Composition for preserving articles of food and the like.

FERGUSON, C. S. 2,532,489, Dec. 5, 1950.

A new composition of matter for coating and preserving articles of food, composition consisting of an aqueous solution of propylene glycol, gelatin and gum arabic in the proportion of 1 to 2 gallons of propylene glycol, 6 to 9 lbs. of gelatin, and 6 to 9 lbs. of gum arabic.

PROCESSING

Gaseous current spray drier.

HALL, J. M. Assignor to Drying & Concentrating Co. 2,531,879, Nov. 28, 1950.

In a dehydrating apparatus for producing a powdered product from liquid material by spraying the liquid material into a circulating gaseous drying medium, a dehydrating chamber having inlet and outlet ports for the gaseous drying medium, means to cause the drying medium to circulate through chamber, and a passage means in the form of an outlet snail to receive the circulated drying medium from chamber, snail extending around outlet port and having a bottom conical wall also sloping inward to increase the sweeping action of the stream of drying material on sloping bottom wall, the apex of top conical wall being above the lower extremity of outlet port.

Foods.

STRASBURGER, L. V. 2,530,212, Nov. 14, 1950.

A method of improving the color characteristics of foods prepared from dehydrated edible legumes selected from the group consisting of peas and beans, comprising dry heating legumes sufficiently to darken them upon subsequent hydration, and subsequently hydrating legumes.

Method of vacuum packing food products under agitation.

ROBERTS, H. L., AND SOGNEFEST, P. Assignors to American Can Co. 2,529,514, Nov. 14, 1950.

The method of packing vegetables and similar food products in hermetically sealed containers so as to preserve their color, flavor, texture, nutritive value and vitamin contents in improved condition, which consists in filling the product in the container with a quantity of canning liquid representing about 7% to 22% of full container volume to create hot sterilizing vapor and hot sterilizing liquid to effect rapid heat penetration when the container is heated and agitated but being insufficient to fill to an

appreciable extent void spaces between the product particles and insufficient to appreciably extract color, flavor and nutritive values from the food product, hermetically sealing container under a relatively high vacuum, then heat processing the sealed container to heat vapor and canning liquid to a sterilizing temperature, and agitating container during the processing period to cause the heated liquid to flow in the void spaces and over all of the product surfaces.

Fish filleting machine.

SAVRDA, C. M. Assignor by mesne assignments, to Fish Machinery Corp. 2,532,198, Nov. 28, 1950.

In a fish filleting machine having a pair of spaced rotatably mounted circular knives adapted to make, in a fish fed thereto tail leading and back downward, a pair of spaced incisions extending upwardly from the back, commencing adjacent the tail and progressing forwardly on the fish, together with fish feeding means for advancing a fish tail leading and back downward to knives; in combination, mechanism for presenting fish to knives as they advance in such manner as to direct their tail feather between vertical planes passing through the leading cutting edges of knives, comprising a tail elevator trough, means for pivotally mounting trough on machine in alignment with fish feeding, means for movement about a horizontal axis disposed transversely of machine, elevator trough being mounted to assume a normally inclined position projecting into the path of a fish advancing through fish feeding means, elevator trough being of a length less than the length of the smallest fish to be filleted on machine, whereby the leading tail portion of a fish as it advances into elevator trough is urged into elevated angular relation with respect to the trailing portion of the fish, tail guides mounted on machine along the path of fish advance, one on either side thereof between elevator trough and knives, and means including pivot means balancing elevator trough so that as a leading tail portion of a fish advances beyond elevator trough and between tail guides pressure of the trailing portion of the fish on trough will tilt the same and leading tail portion will advance into the space between tail guides with a component of downward motion.

SUGAR AND STARCH

Production of white sugar from colored sugar bearing fluids without molasses as a by-product.

BARTZ, J. P. 2,526,111, Oct. 17, 1950.

A sugar composition of matter having superior and improved sweetening and nutritional properties, with reduced fattening qualities, and greater sugar tolerance adaptable as a sweetening material for human use, beverages, food products and other commercial uses comprising mono and disaccharide sugars in a powdered and crystalline state and a water solution vitamin, and from 10 micrograms to 2.5 grams of desirable trace elements per 100 grams of sugar.

Method and apparatus for separating starch from gluten.

KILANDER, A. K., AND EDSALL, L. B. Assignors, by mesne assignments, to Trenton Chemical Co. 2,530,823, Nov. 21, 1950.

The process which comprises making a dough out of ground grain and water with at least part of the bran removed, agitating the dough with enough added water to make a mixture of about four pounds of water to one pound of ground grain present, so as to separate the starch of the grain as a fine suspension carrying gluten aggregates from the grain, separating screening that first fine suspension from the aggregates, reagitating the separated aggregates with water and screening more fine starch suspension from the aggregates, returning more fine suspension to serve as water for the first agitation, collecting the gluten, and carrying off the starch in the first fine suspension.

Flavor bud.

SILVER, D. F. 2,531,536, Nov. 28, 1950.

A flavor bud consisting of an outer encapsulating shell made from a thermoplastic material prepared from a mixture comprising anhydrous dextrose, sodium tartrate, and glucose, with water, in combination with a liquid center comprising a flavoring substance carried by liquid glucose of about Be. 43°.

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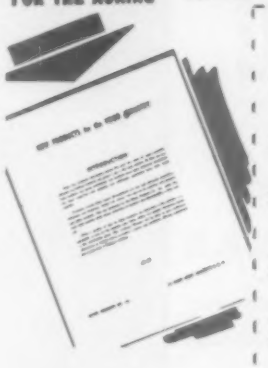

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Regional Section News

(Continued from page 18)

speaking on the subject, "The Sacred God is Strained." He told the group of the many problems that had to be solved during the development of one of his company's new products, "Strained Codfish" for infant feeding. Standardization of consistency, color and mesh and elimination of Struvite crystal formation were among the problems encountered.

Regarding the March 1st meeting, Mr. Joseph H. Cohen, General Manager, Atlantic Gelatin, Division General Foods Corporation, Woburn, Mass., was the guest speaker and his topic was "Gelatin — Its Manufacture and Use in the Food Industry."

The Section also reports that on March 19 a special joint meeting of the Northeast Section and the Boston Society for Quality Control was held in the Patten Restaurant in Boston. The Society furnished the first speaker, Mr. David R. Peryam, Food Acceptance Laboratory, Quartermaster Corps, Chicago, Ill., who spoke on "Measurement of Flavor Quality." The Northeast Section furnished the second speaker in the person of Mr. Frank O. Gallizio, Consulting Chemist to G. F. Heublein & Bros., Inc., who spoke on "Quality Control in the Wine Industry."

Book Review

(Continued from page 19)

Other noticeable change are the omission of chapters found in previous editions on naval stores, leathers, and tanning materials, as well as the appendix, containing definitions of terms and interpretations of results. The chapter heading "Economic Poisons" has been substituted for "Insecticides and Fungicides" of other editions.

While the collaborative procedure of testing the methods of analyses included in this Book of Methods is time-consuming, it is a credit to the Association that methods of this edition utilize many of the newer analytical techniques, such as light absorption spectrophotometry and chromatography, as well as many of the newer procedures for the determination of such substances as hexachlorocyclohexane, 2,4-dichlorophenoxyacetic acid, and pteroylglutamic acid.

C. O. Willits.

EMPLOYMENT NOTICES

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Position Wanted: Food Technologist, technical and administrative background 11 yrs. quality, cost and production control in the canning, freezing and condiment industry. Available in Pacific Northwest after March 15th. REPLY BOX 141, Institute of Food Technologists, 176 W. Adams St., Chicago 3, Ill.

WANTED, Position by graduate Food Technologist with Chemistry and Bacteriology training. Have two years experience in canning and freezing. Interested in any phase of Industry. REPLY BOX 144, Institute of Food Technologists, 176 W. Adams St., Chicago 3, Illinois.

Wanted: Position by Food Technologist, recent graduate, desires pilot plant, production or product development in the New York area. REPLY BOX 142, Institute of Food Technologists, 176 W. Adams St., Chicago 3, Ill.

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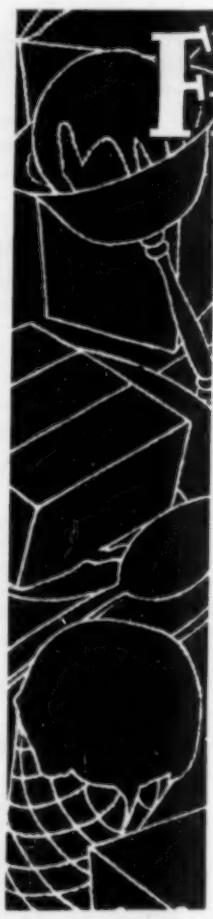

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Book Review

SOME ASPECTS OF FOOD REFRIGERATION AND FREEZING. Edited by Donald K. Tressler. Food and Agriculture Organization of the United Nations, Washington, U. S. A. (1950). 205 pp., 10 tables and 72 figures. Obtainable in the U. S. from International Documents Service, Columbia University Press, 2960 Broadway, N. Y. 27, N. Y. Price $2.00.

Realizing the importance of refrigeration and freezing in the preservation of food stuffs the FAO held a meeting in Copenhagen, Denmark in October 1948, to which all the European countries were invited to send their specialists on refrigeration to exchange information on new developments in the field. The papers delivered by the various experts at that meeting are the main source of the material contained in this book. Of necessity, the papers have been redrafted and revised to include the latest developments in the field and to lend continuity to the text. Pertinent discussion by other persons attending the meeting has been included also.

As is obvious from the title the book is not so complete as the other rather limited number of books in this field. It is a compilation of papers by a group of experts and, as such, should prove of considerable interest to all those concerned, in any way, with the refrigeration and freezing of food.

The sections dealing with the construction of cold storage plants and refrigeration should prove of especial value to those persons involved with the maintenance and control of refrigeration plants and food lockers. The actual producers and processors of frozen food will find the chapters concerning the methods and apparatus for commercial freezing, plant sanitation, and packaging materials both informative and concise. The section on taste testing, though brief, covers the topic with adequacy and is well worth perusal by research workers confronted with judging the color, flavor, and texture of food.

Equally of value are those portions of the book dealing with the principles of refrigeration, ice production, and household refrigerators, home freezers and locker plants, and the discussion on chilled and frozen food including dairy products, fish of all types, fruits and vegetables, meat, poultry, bakery goods, and other miscellaneous products. However, the discussion about rate of freezing seems somewhat overstressed the need for rapid freezing, in the light of the results of recent research on this subject. Obviously, a manufacturer would want to freeze as rapidly as possible to effect economies in plant operation.

The very difficult task of editing this volume was well done and the text is clear, concise and is adequately illustrated throughout with tables, graphs and photographs. The references, over one hundred in number, are arranged topically at the ends of the various chapters for the sake of convenience. Coupled with the very readable type and extensive table of contents (which is in lieu of an index), the resultant booklet is both attractive and satisfying.

Though parts of this paper-bound text are concerned solely with refrigeration and freezing problems in Eu-

(Continued on page 4)

Book Review

(Continued from page 2)

rope, there is abundant worthwhile material of universal significance. It can be said that in this book Dr. Tressler and the other contributors have achieved their aim to present a comprehensive outline of current knowledge in various fields of food refrigeration and freezing which has particular application in Europe, but which is in the main applicable to all parts of the world.

F. A. Lee.

Practical Microscopy. By L. C. Martin and B. K. Johnson. 124 pp., 89 illustrations. Chemical Publishing Co., Brooklyn. Second edition, 1951. Price $2.50.

Many a woman has in her sewing machine gadgets which she does not know how to use. While she uses the machine, the gadgets lie idle, even their purpose unknown. A similar but more serious situation often occurs when a food technologist is called upon to use his microscope. Usually trained in other fields, he often approaches the microscope in a state of ignorance. Who among us has not had the experience of being told that we were not using the microscope properly, that with adjustments of one sort or another not only would the image be more clear, but more accurate? Not only would it be possible to see more easily, but there would be less chance for the drawing of false conclusions. The microscope manufacturing companies, certainly, could tell numerous tales about misuse of the instrument.

In the past, the remedy for this situation has consisted only of thorough study of one of the few books on the microscope, its theory, and its application. Such books are not only heavy reading, but a lot of time is required in their study. Anyone who stumbled upon a problem that required microscopic technique might be inclined to pick at the book, but he would probably find that he did not have the time required for its mastery. Hence, he would be practically obliged to struggle through under his own resources, which would be more or less limited.

Now, there has come to this reviewer's desk the above book, already in its second edition, which is a practical handbook of instruction for the microscopist. It gives the essential knowledge required for intelligent operation of the microscope, and does it in an up-to-date manner, with information on modern methods, including fluorescence, phase and electron microscopy. Being small (pocket-sized) it requires much less of the learner than the older, massive volumes. Nevertheless, the fundamentals of microscopic technique still require time and effort of him who would master the instrument. Even in its simplest form, the physical principles, often expressed mathematically, require mental effort. Yet, here is a book in which the secrets of the microscope are stripped to their bare essentials, and it is to be recommended to all who depend upon the microscope. For simple examinations in which the structures sought are of known size and shape, perhaps, this book might not be necessary. For anyone connected with the development of new knowledge and products or with the teaching of students in the use of the microscope, this book should prove helpful.

The authors are to be commended on their efforts and this reviewer would be tempted to write them, were their address to be found anywhere in the book.

A. W. Hofer.

Adsorption and Chromatography. By Harold Gomes Cassidy. Volume V of "Technique of Organic Chemistry" edited by Arnold Weissberger. 327 pp. plus indices; 56 tables and 53 figures. Interscience Publishers, Inc., New York (1951). Price $7.00.

In view of the rapidly expanding interest in adsorption and chromatographic processes as a solution to problems of purification, separation, and identification, research workers will, indeed, find this volume a timely contribution to the field.

This book might be said to be divided into three main sections. The first, embracing the first two chapters, covers the theoretical aspects of adsorption and chromatography. Writing in a clear, easy, scientific manner, and supplementing the text with figures where necessary, Dr. Cassidy explains the molecular aspects of adsorption dealing in detail with the properties and uses of the liquid-vapor, liquid-liquid, and liquid-solid interface. A highlight of this chapter is the summary in which are described the factors which are involved in the adsorption of a substance from a solution onto a solid surface. The theories of adsorption and the types of isotherms encountered in the measurement of adsorption and the treatment of the data are covered in a brief but adequate manner. Gas-solid and vapor-solid relationships are touched on only briefly for the emphasis, as is evident from the title, has been placed on the needs of the organic chemist.

In the next four chapters the author has gathered together a tremendous amount of information from the literature relating to adsorption, eluents, and adsorbents. The material has been arranged to show the relation between adsorbability and properties of the phases such as solubility, surface tension, and polarity, and the relation between the relative extent of adsorption and such properties of the adsorptive as chemical structure, molecular weight, melting point, association, ionization, polarity and surface tension. One chapter contains graded series of eluents based on differences between homologs, in concentration, and in functionality, and a graded series of adsorbents based on differences in activity and functionality of the surface, together with general rules for predicting the relative extent of adsorption.

Throughout these chapters, generalizations have been made from the literature with the idea that the chemist may use this material either directly or by analogy as an aid in solving problems of separation. Everyone who has ever had to decide what eluent or what adsorbent to use in a particular separation problem will find these chapters of invaluable assistance in solving future problems of a like nature.

The next four chapters describe and explain the various types of adsorptive methods. Here such topics as batchwise adsorption and decolorization, chromatography, ion-exchange adsorption, and partition chromatography with columns, strips and sheets are discussed

(Continued on page 19 following technical papers)

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The Institute of Food Technologists assumes no responsibility for statements in contributed articles appearing in FOOD TECHNOLOGY. Editorials present only opinions of the writers and do not necessarily reflect policies of the Institute of Food Technologists.

Regional Section News

AUSTRALIAN SECTION

The Australian Regional Section held its first meeting since the granting of its Charter on March 7-9 at Wagga Wagga, N. S. W. This was the annual meeting of the Section, and took the form of a small scale Convention.

At the dinner which opened the meeting, a presentation was made to the retiring Chairman, C. E. Norton, who will shortly be returning to the U. S. A., and tributes were paid to the part he had taken in organizing the Australian Section. The new office bearers are:

Chairman: J. R. Vickery
Vice-Chairman: F. C. Elsworth
Secretary-Treasurer: V. M. Lewis
Councillor: H. G. Jessep

Kevin Smith of the Southern Can Co. Pty. Ltd. who will be attending the N. Y. City Convention was appointed Proxy-Councillor to represent the Section at the IFT National meetings.

The Section was pleased to have with it two members of the Northeast Section, W. Rand and Ben Fairbank.

On March 8th, two symposia were presented. In the first on Plant Sanitation, the speakers were J. V. Pascoe, H. G. Jessep, W. J. Scott, and W. Wallman, and in the second on Packaging, the speakers were W. Rand, V. M. Lewis, S. R. Birch, J. F. Kefford and E. Davis. In the evening there were two general talks by members who had recently returned from overseas visits, Mr. F. Midwood speaking on the Japanese Food Industry and Mr. B. O. French on Horticultural Developments in the U. S. A.

A field trip to Batlow was organized for March 9th. The group was entertained at luncheon by the Directors of the Batlow Packing House Coop. Ltd., and after lunch an inspection was made of the canning and fruit packing facilities of Birds Eye (Aust.) Pty. Ltd.

Membership in the Australian Regional Section now totals over 50, and we expect this number to be doubled during the next twelve months.

CHICAGO SECTION

The Chicago Section meetings for the current year are held in the Illinois Room of the Palmer House, Chicago, on the third Monday of each month at 6:30 P. M.

The October 16, 1950 meeting was addressed by Lt. Col. J. S. Kujawski, Commanding Officer of the QM Food and Container Institute in Chicago, who gave a very informative talk on the present stage of development of rations for the Armed Forces.

On November 20, 1950, the speakers of the evening were Dr. Gail M. Dack, Director of the Food Research Institute of the University of Chicago, who spoke briefly on the work done under his direction on *Staphylococcus* food poisoning and Drs. M. J. Surgalia and M. S. Bergdoll who presented detailed reports of the bacteriological and chemical investigations underway on this project at the Institute.

On December 18, 1950, the meeting was addressed by Dr. A. L. Elder, Director of Research for the Corn Products Refining Company, who gave a most interesting and informative talk on the "Utilization of Food Products," principally corn products, and illustrated his talk with Kodachrome slides he had taken during his wide travels over the globe.

On January 15, 1951, Dr. Frank L. Gunderson, Vice-President and Director of Scientific Research and Technical Development for Pillsbury Mills, Inc. of Minneapolis, Minnesota, talked to the section on "Important Nutritional Improvements of Foods — Considered on a World Wide Basis."

On February 12, 1951, the speaker of the evening was Dr. Lloyd B. Jensen, Chief Bacteriologist of Swift and Company, who gave a very interesting talk on the subject of "Consumer Complaints" and the legal problems encountered by the food technologist in defending his product. This meeting was held one week early to avoid conflict with the National Canners Association Convention in Chicago.

Nicholas Appert Award Medalist for 1951

A man who, in the past forty-one years, has devoted virtually all his efforts toward scientific advancement in the fields of foods, drugs, and canning technology has been selected as the Nicholas Appert Award Medalist for 1951. He is ARTHUR E. STEVENSON of the Research Laboratory, Continental Can Company, Chicago, Illinois.

Starting as a chemist for the Kansas State Board of Health in 1909, he later in 1915 became associated with the U. S. Department of Agriculture doing food and drug work. In 1919 he joined the technical staff of the National Canners Association and remained there as chemist and canning technologist until 1926 when he joined the research staff of Continental Can Company.

The award will be presented at the Banquet Tuesday night, June 19, 1951 at the Annual Meeting in New York City. The subject of Mr. Stevenson's talk will be announced later.

WESTERN NEW YORK SECTION

The Section held an afternoon and dinner meeting on March 30th in the Hotel Powers, Rochester, N. Y. Papers heard were:

"Complex Phosphates and Their Uses in Food Processing" by Dr. Harold Gilmore, Calgon, Inc., Pittsburgh, Pa.

"Processing Foods With Added Vitamins for Improved Quality and Food Value" by Dr. J. C. Bauernfeind, Hoffman-LaRoche, Inc., Nutley, N. J.

"The Use of Chemicals in the Improvement of Foods" by Dr. David B. Hand, Head, Department of Food Science and Technology, New York State Agricultural Experiment Station, Geneva, N. Y.

It might be pointed out that Dr. Gilmore was involved in some of the original research in the field of complex phosphates and their uses in food processing. Dr. Bauernfeind has been doing research and development work on added vitamins in foods and Dr. Hand has had a wide experience in the effects of metals, vitamins, and other chemicals upon foods.

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Regional Section News

(Continued from page 8)

Dinner speaker was Dr. Arthur H. Downey, Magnus, Mabee & Reynard, Inc. and his subject: "Methods of Manufacture and Uses of Spices in Foods." Of Dr. Downey it is said that he is one of the best informed men in the country on the chemistry of spices.

On April 17th, a joint meeting of the W. N. Y. Section and the New York State Frozen Food Locker Association was held in the Student's Lounge of the Agricultural and Technical Institute at Alfred University, Alfred, N. Y. The following papers made up the afternoon program:

"Precooked Frozen Foods" by Dr. Jean Simpson, Professor of Foods, Department of Home Economics, Syracuse, N. Y., and co-author of "Frozen Food Cook Book."

"Role of Research in the Distribution of Frozen Foods" by Dr. Kenneth Dykstra, Director of Research, BirdsEye-Snider Laboratory, Albion, N. Y.

"The Present Status of the Frozen Foods Industry" by Mr. E. W. Williams, Publisher and Editor, *Quick Frozen Foods and the Locker Plant.*

A panel discussion under the moderatorship of Mr. George S. Robinson of the A. & T. Institute at Alfred followed the papers, and business meetings wound up the sessions later.

DIXIE SECTION

The Dixie Section held a meeting in Knoxville, Tennessee, on March 16. Dr. Arthur Downey, Vice-President in Charge of Research of Magnus, Mabee and Reynard, delivered an informative lecture on essential oils, spices and flavors. All ladies present were given a bottle of perfume, which added to their appreciation of essential oils. Preceding the banquet and meeting, an inspection trip was made of the recently completed Food Science and Dairy Products buildings of the University of Tennessee.

OREGON SECTION

On February 5th, the Section met at the Food Technology Department, Oregon State College, Corvallis. Dr. Paul F. Sharp gave the opening address before the 30th Annual Canners' and Freezers' School on "Long-time Trends in Food and Nutrition." At a noon luncheon for IFT members, President Sharp gave the members some light on the inner workings and problems of the national organization.

The following letter is printed at the request of the Oregon Section:

Food Technology Dept.
Oregon State College
Corvallis, Oregon
February 23, 1951

EDITOR, FOOD TECHNOLOGY

To the Editor:

Kindly refer to FOOD TECHNOLOGY, January 1951. You will find the Oregon Section News on page 12.

The secretary and members of the Oregon Section are fully aware of the fact that Charles F. Brannan is our Secretary of Agriculture and that he has a plan known as the Brannan Plan.

We wish to inform the person responsible for the uncalled for remark that there might possibly be other ideas on the subject of stabilizing prices of agricultural commodities.

Details of the Brandt Plan (and we do not mean Brannan Plan) may be obtained by writing to the National Milk Producers Federation, 1731 Eye Street, N. W., Washington, D. C.

Very truly yours,

(Signed) CLIFFORD E. SAMUELS
Secretary, Oregon Section,
Institute of Food Technologists.

PUGET SOUND SECTION

The Section qualified as a professional taste panel at the third meeting held in the Rainier Mountain Room of Sick's Seattle Brewing and Malting Company, the evening of March 1st in Seattle, Wash.

Immediately upon arrival, each member was ushered to a table, where taste judging was put to a practical test. Two wholly unrelated products were judged, and results of all individual scores were summarized for use in the panel discussion which followed the scoring of the two products. Some 45 members participated in the judging. A panel presentation on taste-test evaluation followed the taste scoring, in which four members participated, each presenting one special phase of taste-test methodology.

The meeting concluded with a very sumptuous repast served by the genial host.

MOHAWK VALLEY SECTION

At a dinner meeting on January 15th at the Canajoharie Hotel, Canajoharie, N. Y., the Section saw the following officers elected for this year:

Chairman: Edwin J. Abeling, Beech-Nut Packing Co., Canajoharie.

Vice-Chairman: David S. Luscombe, Food Technologist, Beech-Nut Packing Co., Canajoharie.

Recording Secretary and Treasurer: William G. Vogel, Beech-Nut Packing Co., Canajoharie.

Corresponding Secretary: Mary L. Wilson, Beech-Nut Packing Co., Canajoharie, N. Y.

National Councilor: Theo P. Svolos, Beech-Nut Packing Company, Canajoharie.

Following the election of officers, Dr. N. C. Larsen, a flavor expert from Polak and Schwarz, Inc., gave an interesting talk on the subject of "Vanilla."

Another dinner was held on March 12th at the Fort Rensselaer Club in Canajoharie. After a short business meeting M. L. Kubovciak, Mycologist with the Beech-Nut Packing Company at Canajoharie, N. Y., gave an interesting paper on insect detection in both raw materials and finished products. G. L. Alkinburgh, Chemist with the Beech-Nut Packing Company, Canajoharie, N. Y., showed a movie entitled "Make Mine Vanilla."

Dr. W. W. Schultz of the General Electric Company, Schenectady, N. Y., addressed the group's April meeting on how foods and food products are effected by atomic bombing.

FLORIDA SECTION

The Section held a dinner on March 29 in the Park Cafe at Winter Haven followed by a meeting at the Citrus Experiment Station at Lake Alfred. Speaker

(Continued on page 12)

EXTRACTIVE CHEMISTRY COMPOSES

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Regional Section News

(Continued from page 10)

was Dr. Donald E. Bliss from the Experiment Station at Riverside, Calif. and his subject: "The California Date Industry." Illustrating his talk with slides, Dr. Bliss discussed the growing and processing of dates in California. He has been on staff of the California Citrus Experiment Station since 1931, has worked closely with the growers and packers, and has watched the growth and development of the industry.

NORTHEAST SECTION

On April 5th in the Patten Restaurant in Boston, the Section held another enjoyable meeting. Speakers were from Merck & Co., Rahway, New Jersey. Dr. John T. Owen, Technical Adviser to the General Sales Dept., discussed "Factors in Food Spoilage" and Dr. H. A. Fredianni, Head of the Analytical Research Dept., spoke on the "Application of Automatic Carl Fischer Apparatus for Moisture Determination in Food Products."

Final meeting for this year is slated for May 12th to be held at the University of Massachusetts, Amherst, Mass.

PERSONNEL

F. S. Bradhurst of Holbrooks (Australia) Pty. Ltd. is on a business trip to the United Kingdom and the U. S. A.

Victor Conquest, who headed research at Armour and Co. of Chicago for the past twenty years, has been appointed Vice President in Charge of the Research Division of Armour and Co. Congratulations!

Kenneth E. Duggan, formerly with the Food Technology Department, Oregon State College, Corvallis, is now with the Western Branch Laboratory, BirdsEye-Snider Division of General Foods Corporation, Hillsboro, Oregon, as Junior Chemist.

Harry L. Fevold has been appointed Director of Research of Baxter Laboratories, Inc. of Morton Grove, Illinois. For the past several years Dr. Fevold was Chief of the Food Research Division at the Quartermaster Food and Container Institute at Chicago, Illinois.

Stephen L. Galvin, Technical Service Director, The Huron Milling Co. of New York, N. Y. and formerly Director of Research, Continental Foods, Inc. of Hoboken, N. J. (now Thomas J. Lipton, Inc.) has been appointed to the position of Director of Research of the Pepsi-Cola Company of New York. Our best wishes go to Steve who is General Chairman of the forthcoming New York Meetings of the IFT.

A. Haldane Gee, formerly managing editor of *Food Industries*, now *Food Engineering*, at the McGraw Hill Publishing Co., New York, has been appointed Director of Bacteriology and Toxicology with Foster D. Snell, Inc., New York City. Dr. Gee received his master's and doctorate degrees in zymology from the University of Toronto in 1925. He became a research fellow at Yale and later assistant professor of oceanography and bacteriology at the University of California. Prior to joining *Food Industries*, he was research director and then president of Sterisol Ampoule Corporation in Long Island City. In 1938, when Schering & Glatz purchased Sterisol, Dr. Gee continued on as vice president of S&G and as director of development of the William R. Warner Co., the parent company.

Robert A. Larsen, formerly Chief of the Food Laboratories, Polychemicals Department of E. I. Du Pont de Neumours at Wilmington, Delaware, is now Chief of the Cereal and Baked Products Division, QM Food and Container Institute in Chicago. Dr. Larsen received his Ph.D. in 1947 from the University of Minnesota.

C. E. Norton, past Chairman of the Australian Section of the IFT, has resigned as head of the Research Department of Southern Can Co. (Australia) Pty. Ltd. of Melbourne. K. Smith has been appointed his successor. Both will attend the Eleventh Annual Meeting of the IFT in New York in June. During World War II, Chuck Norton was with the U. S. Army in Australia. His many friends will be happy to see him return to his homeland.

Charles M. Wilson, formerly Associate Professor of Bacteriology at the University of Illinois, Urbana, is now with The Borden Company in their Prescription Products Division at Elgin, Illinois. Dr. Wilson received his Ph.D. from the University of Illinois in 1946 after his return from the armed forces. During World War II he served as Officer-in-Charge of the Bacteriology Laboratory and the Mobile Laboratory Field Survey Section of the QM Subsistence Research and Development Laboratory in Chicago.

NECROLOGY

Food Technology regrets to note the passing on March 19 of Ralph E. Sanborn, Plant Coordination Director, California Packing Corp., San Francisco, California, and a leader in the canning industries.

WORLD WIDE PER CAPUT MEAT CONSUMPTION IN 1949

A recent Commodity Report of the FAO, dated December 29, 1950, gives the per caput meat consumption in 1949 in countries from which statistics are available. The per caput consumption in Uruguay, Argentina, Australia, and New Zealand was over 110 kilograms per year; in the United States, Iceland, Canada, and Denmark between 55 and 70 kilograms; in Ireland, France, Sweden, the United Kingdom, and the Union of South Africa between 45 and 50 kilograms; in Switzerland, Brazil, Chile, Cuba, Poland, and Hungary between 30 and 40 kilograms; in Norway, Columbia, Belgium, Netherlands, Finland, Czechoslovakia, Germany (Tri-zone), Peru, Mexico, and Austria between 20 and 30 kilograms; in Yugoslavia, Turkey, and Italy between 10 and 20 kilograms, and finally in Greece, Algeria, Egypt, Philippines, Pakistan, India and Japan below 10 kilograms per caput per year. Statistics for the U. S. S. R. are not available.

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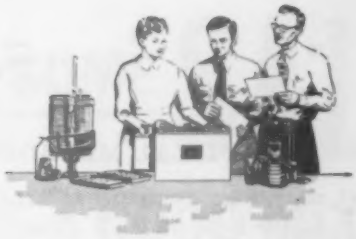

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Selected Abstracts

ANALYTICAL METHODS

A scheme of analysis for commercial detergents. Part I.

GILBY, J. A., AND HODGSON, H. W. *Mfg. Chemist, 21,* 371-6 (1950).

The analysis is based upon the investigation of 40 samples of detergent products now on the market. It indicates the type of detergent and the fine structure of the active principle. 46 references.

The use of ion-exchange resins in the determination of fruit acids.

WILSON, J. B. *J. Assoc. Offic. Agr. Chemists, 33,* 995-1002 (1950).

A method is presented in which l-malic acid is isolated from maple sirup, mixed maple sirups, and apple juice by means of ion-exchange; and the malic acid determined by polarization in the presence of uranium acetate. Similar technic is applied to solutions of tartaric acid and citric acid after which the tartaric acid is determined by the bitartrate method, and citric acid by the pentabromacetone method.

A study of the use of ion-exchange resins for the removal of non-sugar reducing substances in the analysis of fresh and dehydrated vegetables for reducing sugars.

WILLIAMS, K. T., BEVENUE, A., AND WASHAUER, B. *J. Assoc. Offic. Agr. Chemists, 33,* 986-94 (1950)

In the preparation of plant materials for sugar analysis, the samples should not be dried prior to the extraction procedure. Instead, the fresh material should be immersed in hot redistilled alcohol, as directed by the official method of the A. O. A. C. Selected ion-exchange resins, used in a batch procedure, provide a simple and effective method for the removal of non-sugar reducing substances from extracts of dehydrated plant materials preparatory to their analysis for sugars. The determination of sugars in resin-clarified plant extracts by the A. O. A. C. micro copper method gave the most reliable sugar results in this investigation. Experimental evidence indicates that non-sugar reducing substances are formed in vegetables during the drying process, even though precautionary measures are exercised to prevent heat-damage.

A new method for the determination of fat in corn products.

HAMPEL, G. *Getreide, Mehl Brot., 2,* 69-70 (1948); *J. Am. Oil Chem. Soc., 27,* 576 (1950).

The finely ground sample is placed in a tube and petroleum ether percolated through the tube at a low rate for four hours. The amount of oil extracted is determined by evaporation of the solvent. Agreement with the Soxhlet method is within 0.1%.

The nutritive value of fish meal and condensed fish solubles.

TARR, H. L. A., SOUTHCOTT, B. A., AND BISSETT, H. M. *Fisheries Research Board Can. Pacific Coast Sta., 85,* 83-5 (1950).

Outline of analyses for vitamin B_{12} and amino acids. Small-scale laboratory tests indicate that the B_{12} content of herring stickwater can be increased at least 15 times with organisms such as *Streptomyces griseus* and *aureofaciens* and a trace of a Co salt.

BIOLOGICAL SCIENCES

BIOCHEMISTRY

Toxicity of vitamin B_{12}.

Nutrition Revs., 42, 324-5 (1950).

Work is reviewed which demonstrates that in mice, intraperitoneal and subcutaneous injections of from 1.5 to 3.0 mgs. per kg. of vitamin B_{12} are fatal.

Relation of vitamin A and "lard factor" to disease caused by rancid lard.

KAUNITZ, H., AND SLANETZ, C. A. *Proc. Soc. Exptl. Biol. Med., 75,* 322-26 (1950).

The fatal disease occurring in rats maintained on a vitamin A-free diet containing 10% rancid lard could be prevented by feeding massive doses of synthetic vitamin A palmitate, crystallized beta-carotene or cod liver oil. Addition of the distillate fraction of molecularly distilled lard to the diet largely prevented the disease although this fraction contains only traces of known forms of vitamin A. This "lard factor" when added to the diet was more resistant to the action of the rancid lard than beta-carotene and vitamin A palmitate. It was concluded that rancid fats are not toxic, per se., and that under natural conditions, the "lard factor" may play an important part in prevention of disease ascribed to vitamin A deficiency.

NUTRITION

The influence of low levels of protein on heat production.

BLACK, A., MADDY, K. H., AND SWIFT, R. W. *J. Nutrition, 42,* 415-22 (1950).

Study of the influence of various levels of protein in equicaloric diets on protein and energy metabolism has been extended in the present experiment to include very low levels of protein, 6 previous studies having covered the range of protein intake from 10-45%. Using a 70-day metabolism and body analysis technic with three groups of 12 litter-mates, growing albino rats, a comparison was made of three diets containing 6, 8 and 10% protein respectively, these diets being so compounded and fed as to supply each rat of a set of triplets the same gross energy, vitamins and minerals. Gains in life weight, retention of nitrogen and fat in body tissue, increased digestibility of nitrogen, and decrease in heat production were in the order of increasing protein content of the diet.

Molecularly distilled monoglycerides. III. Nutritional studies on monoglycerides derived from cottonseed oil.

AMES, S. R., O'GRADY, M. P., EMBREE, N. D., AND HARRIS, P. W. *J. Am. Oil Chemists Soc., 28,* 31-3 (1951).

Monoglycerides, prepared from cottonseed oil, were fed to 3 generations of rats at a 15% and a 25% level as the sole source of fat in the diet. Refined cottonseed oil was fed to comparable groups of rats at the same levels. No significant differences were found between the monoglycerides and the cottonseed oil in their nutritive value as measured by growth response, reproduction ability, and lactation performance. Absorption of fatty acids, either as monoglycerides or as the original oil, from the intestinal tract was the same as shown by essentially equal coefficients of absorption for the two types of lipid at a 25% level in the diet.

The effects of chlorine dioxide on the nutritive value of wheat gluten.

ALLISON, J. B., WHITE, J. I., AGEMIAN, E. P., AND ROTH, J. S. *Cereal Chem., 27,* 495-500 (1950).

The nutritive value of wheat gluten, determined in puppies or in adult dogs, was not altered by treating flour with chlorine dioxide in amounts up to 1.83 gm. chlorine dioxide per hundred wt. There was no evidence of running fits, either clinical, or in electroencephalograms in dogs fed chlorine dioxide-treated wheat gluten. Abnormal electroencephalograms were obtained from dogs fed wheat gluten prepared from flour treated with nitrogen trichloride long before clinical symptoms of abnormalities appeared.

(Continued on page 20)

Book Review

(Continued from page 4 preceding technical papers)

with regard to the principles involved. The apparatus, materials, theories, advantages, applications, and limitations of the various methods are considered. The discussion here is general in nature in that no detailed procedures for specific separations have been given. This is a desirable feature of the book for where instructions are specific their use is limited. The numerous references to the literature are conveniently located at the bottoms of the pages for the reader who wishes more complete information on any particular topic. The last chapter contains a few simple experiments which will serve to familiarize the neophyte with the various techniques involved in adsorption and chromatography.

The excellent use of figures and tables for clarification of the text, the numerous references covering developments in the field up to and including 1950, the logical arrangement of the material, the complete subject and author indices, and the physical format of the book all help to make this volume both an attractive and useful one.

Food technologists, agricultural and plant chemists, biochemists, in fact all persons involved in the separation, isolation, identification, or purification of organic materials should find this volume a welcome and necessary addition to the reference shelf.

LILLIAN B. KIMBALL.

FUTURE DATES FOR FOOD TECHNOLOGISTS

1951

May 7-8	Associates, Food and Container Institute. Annual Meeting. Mayflower Hotel, Washington, D. C.
June 3-7	National Confectioners Association. Stevens Hotel, Chicago, Ill.
June 5	American Association of Candy Technologists. Annual Meeting. Stevens Hotel, Chicago, Ill.
June 5-18	International Food Exposition. Chicago, Ill.
June 17-20.	**Institute of Food Technologists. Eleventh Annual Meeting. Hotel New Yorker, New York, N. Y.**
June 27-29	National Pickle Packers Association, Midyear Meeting, Sheraton Hotel, Chicago, Ill.
August	World Poultry Science Association. Ninth Congress. Paris.
Aug. 2-Sept. 11	Eighth International Congress of Refrigeration. London.
Aug. 6-10	Food and Nutrition Sessions, Gordon Research Conference, AAAS. Colby Junior College, New London, N. H.
Sept. 8-13	XIIth International Congress of Pure and Applied Chemistry. New York, N. Y.
Sept. 26-29	International Association of Milk and Food Sanitarians. Glenwood Springs, Colo.
October	International Association of Ice Cream Manufacturers. Detroit, Mich.
October	International Canning Conference. Paris.
Oct. 24-26	National Pickle Packers Association, Annual Meeting, Sheraton Hotel, Chicago, Ill.
Oct. 1-3	Association of Official Agricultural Chemists. Shoreham Hotel, Washington, D. C.
Nov. 5-8	Refrigeration and Air Conditioning Exposition, Navy Pier, Chicago, Ill.
Nov. 12-15	American Bottlers of Carbonated Beverages. Annual Meeting. Armory, Washington, D. C.

(Information concerning future dates of national and international meetings, conventions and exhibits of interest to food technologists should be sent to the editorial office.)

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Abstracts

(Continued from page 18)

An unknown factor with vitamin A activity distilled from lard.

KAUNITZ, H., AND SLANETZ, C. A. *J. Nutrition, 42,* 375-89 (1950).

The nutritional effects on rats of the distillate and residue fractions of molecularly distilled lard were studied. When vitamin A-free diets containing the residue fraction as the fat source were supplemented by distillate, or when this material was injected, the animals could be protected against the signs of vitamin A deficiency. The protection given by 2% distillate seemed nearly complete and was much better than that provided by weekly injections of 7.5 units of vitamin A palmitate. It is concluded that lard contains a factor with vitamin A-like activity but which is chemically different from the known forms of vitamin A.

Survival in the cold.

BLY, C. G., JOHNSON, R. E., CONSOLAZIO, C. F., SWAIN, H. L., LAVDANI, A., MALONEY, M. A., FIGUEVOA, W. G., AND IMPERIALE, L. E. *U. S. A. F. Med. Jour., 1,* 615-28; *Am. J. Digestive Diseases, 17,* 380 (1950).

Thirty-two volunteers flown from Florida (70° F.) to Manitoba, Canada (—20° F.) to field test nutritional requirements of rations for survival in cold. Metabolic balance studies were made for 12 days on the four groups of men each group on a different diet. Clear answers were obtained on balance requirements for calories, water, protein, carbohydrate, fat, sodium, potassium, chloride, calcium and phosphorus. Observations suggest general adaptation syndrome with stimulation of pituitary-adrenocortical system. It is proposed that further study should include pre-acclimatizing with ACTH.

FOOD PRODUCTS

BAKERY PRODUCTS AND GRAINS

Polyoxyethylene monostearate as an anti-staling adjunct in bread.

CARSON, B. G., MARNETT, L. F., AND SELMAN, R. W. *Cereal Chem., 27,* 438-51 (1950).

Various methods for determining the physical changes taking place during the staling of bread baked with and without the addition of polyoxyethylene monostearate have been evaluated. Measurements of the decrease of crumb thickness indicate that the use of this adjunct markedly retards the firming of bread as it ages from 4 to 115 hours. The crumbliness test for staling, the Katz method for measuring the decrease in soluble starches, the swelling power test, and the farinograph method of measuring the decrease in water absorptive capacity give anomalous results when bread contains polyoxyethylene monostearate. This failure to give measurements indicative of the age of the bread is attributed to the polyoxyethylene monostearate having reduced the hydrophilic characteristics of the starch so that the normal molecular alignments of starch chains with each other and with water fail to occur. The only traditional staling rate measurements which appear to be of value are those dealing with changes in softness and possibly in crumbliness, but crumbliness appears to be more indicative of tenderness than of age.

Wet milling of grain sorghum.

ZIPF, R. L., ANDERSON, R. A., AND SLOTTER, R. L. *Cereal Chem., 27,* 463-76 (1950).

Studies on the recovery of starch, gluten, and oil from grain sorghum showed that this grain could be processed satisfactorily by methods similar to those employed industrially for the wet milling of corn. Optimum separations of starch and gluten were obtained when grain sorghum was steeped at 110° to 120° F. for 24 hours or longer, in a solution of 0.2 to 0.25%

Abstracts

sulfur dioxide in water. To produce sorghum starch of comparatively low protein content (0.35 to 0.7%), it was necessary to increase the pitch of the starch table over that used for wet milling corn. Some varieties of grain sorghums have a highly pigmented layer. When this layer was removed by pearling, a whiter starch could be produced than from the whole sorghum grain. The hull fraction contained a carnauba-like wax, small amounts of which were recovered by solvent extraction with hexane. Samples of grain sorghums of 2 varieties that had been harvested at 3 moisture levels and dried with air at temperatures of 125°, 150°, 175°, and 200° F. were wet milled to determine the effect of such artificial drying on the milling characteristics of the grain. It was concluded that no damage to wet-milling operations occurs when grain sorghum is artificially dried, provided the grain is not dried to less than 11 to 13% moisture.

GELS AND PECTIN

The mechanism of pectin jelly formation with respect of pH conditions, with particular reference to setting temperature phenomena.

HARVEY, H. G. *J. Sci. Food Agric., 1,* 307-11 (1950).

The phenomenon of setting temperature of pectin-sugar jellies is considered in the light of the dissociation hypothesis of jellying propounded earlier by Hinton. The concept of setting temperature is shown to follow directly from the hypothesis and the dependence of setting temperature on such factors as pH value, pectin concentration and soluble solids is accounted for. A slight modification of the original theory provides a quantitative explanation of some of the differences in jellying behavior caused by different metallic buffer salts. The modified theory is shown to lead to a simpler conception of effective ionization and this in turn is used to account for some of the difference in jellying behavior brought about by alterations in the degree of esterification of the acid groups of the pectin molecule.

The setting temperature of pectin jellies.

HINTON, C. L. *J. Sci. Food Agric., 1,* 300-07 (1950).

The setting temperature of a pectin jelly is shown to be a determinate physical property, whereas the setting time is a secondary property dependent on temperature conditions. A technic for measuring setting temperature is described. As ordinarily manifested, the setting temperature is subject to undercooling effects. It is shown that, as with jelly strength, pH conditions are a primary factor in regard to setting temperature, increase of pH causing a rapid fall of the latter; and that soluble solids concentration, pectin concentration, nature of buffer cations and heating have subsidiary effects. The setting temperature does not appear to be related to the jelly strength in any direct way, as judged by a comparison of the effects of the factors studied on the two properties.

Gelling properties of a water extract of trichloroethylene-extracted soybean oil meal.

ARNOLD, L. K., AND CHEN, S. L. *Soybean Digest, 10,* 26-7, Sept., 1950.

Soybean protein has found considerable use in adhesives, paper sizing, water thinned paints and fire fighting foam. A water-soluble product called "Gelsoy" composed of both proteins and carbohydrates has been produced by water extraction of ethyl alcohol extracted soybean oil meal. A 10% water solution of this product when heated to 90° C. for a minute followed an irreversible gel which was self supporting. It has possibilities as an egg white substitute. Report also covers the gelling properties of a water extract of a trichloroethylene extracted soybean oil meal.

Methods for characterization of pectins.

BERGLUND, D. T. *Socker Handl., 6,* 219-23 (1950).

Suitable chemical and physical methods for characterization of pectins are described. The methods are determination of

Volume III

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moisture, ash, acetyl groups, total uronic groups, methyl groups, intrinsic viscosity and gelforming capacity. The acetyls are determined by means of saponification and distillation. The determination of methyl groups by means of pectin methylesterase is shown to be inadequate. The intrinsic viscosity is determined on a sample saponified with ammonia and with added polyphosphate. The jelly strength is calculated by means of a new equation. The standard jelly strength is proposed to be 400,000 cgs-units.

PATENTS

CANNED AND FROZEN FOOD

Method and apparatus for heat-treating foodstuffs in containers.

WILBUR, P. C. Assignor to Food Machinery and Chemical Corp. 2,536,116, Jan. 2, 1951.

The method of processing sealed cans of food products comprising heating sealed cans by passing them through a confined heating region containing a heating medium composed of a mixture of non-condensable gas and steam, maintaining a predetermined pressure of the mixture throughout the heating region, and maintaining a gradient in temperature of the mixture which temperature gradient increases in the direction in which the cans pass through the heating region.

Frozen food product and method of making the same.

LUNDQUIST, N. H. Assignor to Cresthaven Farms. 2,536,137, Jan. 2, 1951.

The process of making a frozen food product which consists in providing sweet cream having a fat content of approximately 50%, churning cream, taking the buttermilk resulting from churning, condensing the same, adding a sweetening agent and freezing mixture while being stirred whereby butter-milk is the main and principal ingredient of product.

Apparatus for quick-freezing foods.

BAKER, C. A., AND MATHEWS, G. W. 2,537,390, Jan. 9, 1951.

In an apparatus of the character described, a housing having a freezing chamber for articles to be frozen, means for delivering a freezing air to chamber, means in the housing for maintaining freezing temperature of the liquid freezing medium, and means for discharging the liquid freezing medium through the freezing air to maintain freezing temperature of air.

CEREALS AND GRAINS

Corn popping apparatus and ventilator therefor.

MANLEY, C. T. Assignor to Manley, Inc. 2,536,298, Jan. 2, 1951.

In a corn popping apparatus, a cabinet, a cooking element in the cabinet, a Venturi tube communicating the interior of the cabinet with the atmosphere, a duct on the cooking element terminating adjacent to and spaced from the point of communication of the Venturi tube and cabinet, a blower, and means including a nozzle in the tube connected with the blower for directing a jet of air into the Venturi tube toward the atmosphere for inducing flow of fumes simultaneously from the cabinet and cooking element.

Corn popping apparatus.

CRETORS, C. J. Assignor to C. Cretors & Co. 2,537,744, Jan 9, 1951.

In a corn popping apparatus, a popping pan, supporting means below pan, means pivotally mounted pan off-center upon supporting means for a manual swingable movement from a substantially horizontal popping position to a substantially inverted dumping position, spring means disposed between the supporting means and pan, a part of spring means, when pan is in popping position, normally tending to swing the pan toward its dumping position, and another part of spring means, when pan is in dumping position, normally tending to swing pan back to popping position.

Preparation of flour bleaching compositions.

MITCHELL, W. A. Assignor to General Foods Corp. 2,535,313, Dec. 26, 1950.

The process of preparing a finely divided bleaching composition for dry admixture with flour to be bleached which comprises forming a solution of benzoyl peroxide, diluting the solution with a precipitant for benzoyl peroxide which is miscible with the peroxide solvent while suspending finely divided starchy material in the liquid mixture to cause precipitation of the peroxide in the presence of the suspended starchy material, and then separating the starchy material and the precipitated peroxide from the liquid suspension and drying the same.

CONFECTIONERY

Food article and method of making.

KIMBALL, F. T. Assignor to Orizar Products Inc. 2,538,202, Jan. 16, 1951.

A food article including (1) an inner layer comprising a creamy fondant mixture of sucrose, an aqueous syrupy solution of a sugar selected from the group consisting of dextrose, levulose, and invert sugar, air in the form of fine bubbles, and powdered protein dispersed in solid form in the fondant and somewhat concentrated in the interfaces between the bubbles of air and the liquid phase in the fondant and (2) an outer layer that is solid at room temperatures and comprises chocolate and sucrose in intimate admixture.

Method and apparatus for making confectionery.

ALIKONIS, J. J. Assignor to P. F. Beich Co. 2,536,340, Jan. 2, 1951.

A method of making foam type confectionery, comprising the steps of advancing liquid confectionery stock, confining and premixing stock with a gaseous diffusion medium, subjecting premixed stock and medium to a preliminary impact atomizing operation, and thereafter passing stock and gaseous diffusion medium through a porous diffusing agency to globulize medium and distribute the same uniformly throughout stock.

FATS

Shortening and method of making shortening.

ANDERSON, E. G. Assignor to the E. Kahn's Sons Co. 2,536,865, Jan. 2, 1951.

A process for preparing shortening which comprises heating a mixture including a major proportion of steam lard and minor proportions of edible beef tallow and lard flakes to a temperature between 440° F. and 485° F. in a vacuum, holding the mixture at a temperature above 425° F. while agitating with steam for a sufficient time to cause removal of substantially all free fatty acids, odor-bearing materials, and carriers for food odors and flavors, and then cooling the mixture while maintaining the vacuum.

Ornamental preserving coating for food articles.

SAG, B. 2,536,701, Jan. 2, 1951.

The method of applying an ornamental preserving coating to an article or package of food including chocolate, which consists in applying at least two layers of crinkled metal foil to the article, then dipping the article in a bath of melted fatty substance having a melting point of about 104° F. to 124° F. and maintained at a maximum temperature of 140° F., cooling rapidly to solidify the fatty coating without affecting the food, decorating the solidified coating, and then applying a liquid coating of transparent lacquer which dries with a high luster simulating a porecelain surface.

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FISH AND SEAFOOD

Machine for peeling shrimp.

LAPEYRE, F. S., LAPEYRE, III, J. M., AND LAPEYRE, E. M. Assignors to Peelers, Inc. 2,537,355, Jan. 9, 1951.

In a machine for peeling shrimp, a channel through which the shrimp are adapted to move comprising a base roller and two spaced channel rollers above and in contact with opposite side portions of the base roller to provide a nip running longitudinally at each side of the channel, and means on the machine to impart an oscillatory motion to the base roller to move the shrimp in the channel from one side nip to the other.

Process for reducing fish or fish offal.

BRADFORD, C. R. 2,536,345, Jan. 2, 1951.

The method of continuously reducing fish to fish meal and fish oil which comprises the steps of continuously cooking the fish to reduce the water content thereof to a critical range of from 40% to 50% by weight; continuously passing the cooked fish to a countercurrent wash or organic solvent to dissolve the fish oil from the fish and coagulate the protein in the fish meal; and separately recovering the fish oil from the solvent and drying the separated fish meal.

Fish boning device.

BERGLUND, R. M. Assignor to Pacific American Fisheries, Inc. 2,534,219, Dec. 19, 1950.

A fish boning machine comprising a feed table having its upper surface provided with a channel, table being grooved parallel to and on both sides of channel, conveying means located above grooves and moving parallel to channel, conveying means having guiding elements adapted to move in grooves, driving means to move conveying means, and cutting means aligned with channel.

Method for severing the heads from the bodies of shrimp.

GREINER, C. A., AND FORRESTER, E. 2,534,767, Dec. 19, 1950.

A method of separating the head from the body of a shrimp consisting in directing against the shrimp a blast of fluid under sufficient pressure to cause the head to be severed from the body.

Bulk feed fish machine.

CHRISTIANSEN, A. L. 2,535,349, Dec. 26, 1950.

In a means of the class described, a fish processing unit having a conveyor provided with transverse pockets, means for supplying fish to unit, means comprising a receptacle containing water in which fish are adapted to float and provided with a discharge opening, a gate for the receptacle opening adapted to uncover the opening to permit the discharge of fish, and fish distributing means having a hopper for receiving water and fish suspended therein from supply means, distributing means connecting supply means with the processing unit for directing fish to successive pockets of the conveyor and at opposite ends of the pockets.

Device for deveining shrimps.

KITE, D. N. Assignor to M. E. Feldkamp and M. K. Kite. 2,537,836, Jan. 9, 1951.

Shrimp cleaning and shelling device means comprising, a fixed lower jaw assembly, an upper jaw assembly articulately

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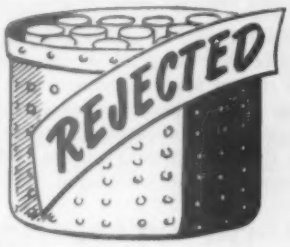

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secured to the fixed lower jaw assembly, guide slot means in the upper jaw assembly, and guided knife means mounted slidably in the guide slot means.

Procedure for making fodder meal and oil from animal raw materials.

VALEN, O. Assignor to A/S Lys and Sildolje & Kraftforfrabrik, Lys sund pr., Trondheim, Norway. 2,534,640, Dec. 19, 1950.

In the processing of fish for the preparation of fodder meal and oil, the steps which comprise cooking the fish by indirect steam heating whereby "glue water" subsequently obtained is not diluted, pressing the cooked fish to obtain a press cake of wet fodder meal and an aqueous liquid extract comprising "glue water" and fatty oils, separating the oil from the "glue water," half-drying the press cake, admixing the "glue water," without concentration thereof, with the press cake, and completing the drying of the press cake, whereby the dried cake thus contains the dissolved solids of the "glue water."

FLAVORS

Food flavor intensifiers.

PHILLIPS, W. 2,539,160, Jan. 23, 1951.

A composition for intensifying the flavor of foods and beverages, which consists essentially of a non-toxic solution having as the solvent a lower aliphatic alcohol belonging to the group consisting of ethyl alcohol and a non-toxic glycol, and an extract of gentian and ascorbic acid as solutes.

FRUIT

Citrus fruit juicer.

POLK, SR., R. Assignor to The Polk Development Co. 2,538,590, Jan. 16, 1951.

The method of extracting juice from citrus fruits which comprises the step of quartering the whole fruit into segments, the step of depositing all of one fruit upon a colander surface, and the step of applying pressure upon the skin surfaces of the segments toward the colander surface and progressively along the segments and in directions to reverse the transverse curvature of the skin, pressure being sufficient to express juice and insufficient to cause substantial oil-cell rupture.

Process for preserving fruit.

HARRISS, L. J. 2,536,176, Jan. 2, 1951.

The process of preserving apples which consists of the steps of slicing the apples into slices, each having a maximum thickness of about three-eighths of an inch, mixing the apples thus sliced with an amount of ascorbic acid sufficient to penetrate slices and prevent browning thereof upon thawing, and then freezing the mixture.

Dietetic canned fruits and methods of making the same.

WEAST, C. A. 2,536,970, Jan. 2, 1951.

Canned fruit having small amounts of saccharin and added pectin incorporated therein, the amount of added pectin being at least 15 times the amount of saccharin.

GELS AND PECTIN

Gelatinous composition of matter and method of preparing same.

KOCH, L. Assignor to H. Kohnstamm & Co. Inc. 2,535,538, Dec. 26, 1950.

The method of forming a colored gelatinous composition of matter which comprises forming an aqueous-glycerin solution of a color compound, colloidally dispersing the color solution mechanically into a liquid phase aqueous gelatinous solution, incorporating in the liquid phase colloidal dispersion thus obtained a proportion of an edible dispersing agent for colloidally dispersed color solution, and cooling the dispersion to the solidification temperature of the gelatinous solution.

Pectin jelly compositions.

KAUFMAN, C. W. Assignor to General Foods Corp. 2,533,471, Dec. 12, 1950.

A pectin jelly composition of the low-sugar type comprising a mixture of two pectinous ingredients, the jellification ingredient consisting of low-equivalent-weight-pectin capable of forming a jelly of less than 30% soluble solids, the other pectinous ingredient consisting of a smaller amount of high-equivalent-weight pectin that does not jellify with less than 30% soluble solids, other ingredients reducing syneresis in the finished jelly.

Edible calcium alginate jelly.

ANGERMEIER, H. F. 2,536,708, Jan. 2, 1951.

A batch for forming an edible calcium-alginate jelly, which comprises a water-soluble alginate, a calcium salt which is soluble in a water solution containing alkali-metal phosphate glass, sugar, and water, batch having a pH between about 6 and 8 and when boiled to increase the solids concentration, acidified, and cooled producing a calcium-alginate jelly.

MILK AND MILK PRODUCTS

Method of and apparatus for heat-treating evaporated milk.

WILBUR, P. C. Assignor to Food Machinery and Chemical Corp. 2,536,115, Jan. 2, 1951.

The method of heat treating canned evaporated milk which comprises heating the cans of milk by introducing them into a gaseous heating medium containing steam at a temperature enough higher than that of the milk to cause "burn-on" if the heating medium were composed of steam alone, and preventing such "burn-on" by admixing non-condensable gas with steam prior to the introduction of the cans into heating medium.

Semisolid food product and process for making same.

GRELCK, W. P. M. 2,536,438, Jan. 2, 1951.

A method of producing a food product of semi-solid consistency in which the sugar of milk content is free from active crystals of the same comprises, the grinding of the previously dried whey as the principal ingredient to a flour like powder, to which the required amount of dried non-fatty milk solids are added together with semi-solid brewers yeast and the addition of water is so timed that the finished product contains an average sixty percent total solids, the mass is thoroughly mixed in a suitable mixer to a smooth, homogeneous consistency at normal temperature, then packed in airtight containers.

Food product and method of production.

GRELCK, W. P. M. 2,536,439, Jan. 2, 1951.

A method of producing a granular food product free from active crystals of sugar of milk which comprises the mixing of dry powdered whey as its principal ingredient with dry non-fatty milk solids together with semi-solid brewer's yeast and salt to a homogeneous granular mass.

SIRUPS

Table sirup and method of making the same.

SEBRING, A. A. 2,537,192, Jan. 9, 1951.

The method of making a table sirup having the characteristic flavor of natural maple sirup, which consists in boiling a mixture of water and dry corn cobs until the sugars are thoroughly extracted from the cobs and then continuing the boiling to at least partially concentrate the extract, then adding to the extract a relatively small percentage by volume of a commercial sucrose to increase the sucrose content of the product and to impart a viscosity commensurate with that of natural maple sirup.

FAO BULLETIN ON CALORIE REQUIREMENTS

The task of the Committee on Calorie Requirements, convened to advise the Food and Agriculture Organization of the U. N. on methods of assessing calorie requirements, was that of defining general principles and making general recommendations which could be applied, with appropriate adjustments, in different parts of the world and to different peoples. In the existing state of knowledge, any recommendations of this nature must be provision. But even tentative recommendations will be of immediate practical value, not only to FAO itself, but also to its member countries and to nutrition workers and others concerned with the problem of food requirements.

The method adopted by the Committee was that of extrapolation from the requirement of a reference individual. The reference man, for instance, is 25 years old, free from disease, exhibits a normal degree of physical fitness, weighs 65 kilograms, and lives in a temperate zone at a mean external temperature of 10° C. He consumes an adequate, well-balanced diet, neither gains nor loses weight, spends eight hours of each working day in activity such as a job in light industry, driving a truck, dairy-farming or market gardening, or general laboratory work, spends four hours in "sedentary" activity (e.g. reading, writing), takes a walk of 5 to 10 kilometers on the level, and spends at least two hours out of doors; and on nonworking days, he takes part in exercise or sport not of the extremely strenuous variety. In the judgment of the Committee, a man as defined above needs, as an average for the entire year, 3,200 calories daily.

Various aspects of the problem of calorie requirements such as state of health, presence of disease, nutritional rehabilitation, character of the diet and race are discussed. Specific factors which influence calorie requirements, as body size, age, environmental conditions and activity, are considered in some detail. The effect of body size, age and temperature of environment, are expressed in quantitative terms and examples are given of the way in which the reference requirements can be adjusted when calculating the requirements of people who differ from the reference with respect to any one or all of these factors. Method of calculating the average daily per caput calorie requirements of different population groups are illustrated.

Throughout the report it is emphasized that the requirement figures given and the quantitative system of adjustment recommended, are provisional and tentative, and are open to modification as more data on diet and health becomes available. The system of assessing calorie requirements of various population groups living under various environmental conditions recommended by the Committee is a relatively simple one, and is of such a nature that the validity of the premises on which it rests can be tested. These premises are listed and the lines of future research needed to qualify and extend knowledge of calorie requirements are given.

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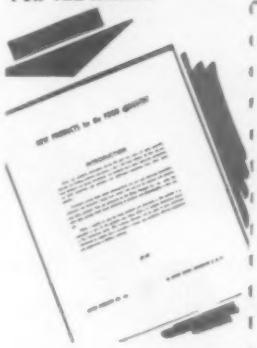

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The report is entitled *Calorie Requirements*, Report of the Committee on Calorie Requirements. (FAO Nutritional Studies No. 5, 72 pp. 75 cents.) It includes two Appendices, one concerned with the relationship between calorie requirements and body size, and the other with the application of the calorie requirement figures in assessing the adequacy of food consumption levels and national food supplies, and establishing food production and consumption targets.

FISH PONDS IN THE U. S.

In Southeast Asia and Europe, ponds are constructed principally for the production of fish for food. Such is not the case in the United States of America, where the production of food from ponds is a minor consideration. The importance of ponds in the United States lies first in their recreational value for sports fishing and secondly in their use for stock-watering, water storage, and the control of soil erosion.

A paper by H. S. Swingle of the Alabama Agricultural Experiment Station (Transactions of the Fourteenth North American Wildlife Conference, Wildlife Management Institute, Washington, D. C. 1949, pp. 295-312) outlines some of the recent developments in pond management in the United States. During the past 15 years, approximately 100 times as many ponds were constructed in the United States as were built in the preceding two centuries. It is estimated that approximately 1,111,000 ponds with a total area of 530,000 acres are now in use. Of this number, about 8,000, with an area of 40,000 acres, were constructed prior to 1935.

Many of these ponds were built for stock-watering and other purposes, but thousands were constructed for the principal aim of providing sports fishing.

While the original impetus to the pond-building program for fish production was supplied by the experimental work on pond construction and management begun in 1934 by the Alabama Agricultural Experiment Station of the Alabama Polytechnic Institute, its extensive development and expansion to all parts of the United States were made possible by the co-operative assistance rendered to pond owners by various federal and state government agencies.

In many regions, yields from the ponds are low because only a small percentage are being properly managed. Often, trained technicians are not available in these areas to offer instruction to the owners. There is a real need for trained personnel in this field, since the task of teaching fish culture practices to approximately a million new pond owners is tremendous. Under these conditions, some failures are expected, but increased interest and continued construction of ponds indicates that the over-all program has been a success, particularly from the fisherman's point of view. Ponds are providing better fishing than has been enjoyed in streams and lakes in many sections of the country. They have also brought fishing to many sections where formerly none existed.

The greatest production from fish ponds can be obtained from species of fish which feed largely on microscopic plants. However, such species are not suitable in the United States where the fishermen want a sports fish and, in addition, a fish relatively free from bones. Of the hundreds of species found on the North American continent, only a few are at present desirable, the most important being largemouth bass *(Micropterus salmoides)*, bluegill *(Lepomis macrochirus)*, red-ear sunfish *(Lepomis microlophus)*, white crappie *(Pomoxis annularis)*, and black crappie *(Pomoxis nigromaculatus)*. Of the species or combinations found to be usable in ponds, the bluegill-largemouth bass combination has given the highest production and is still the best for most of the United States.

Research is being continued in an increasing number of states on one or more phases of pond management, but Alabama is one of the principal states with extensive facilities for pond research. Mr. Swingle states that the Alabama Agricultural Experiment Station has 134 experimental ponds, with a total area of 140 acres, which are being used for research purposes. Most of the pond fish research being done in the United States is directed towards obtaining better pond species and more efficient combinations of fish for sports fishing. Little is being done to develop fish production from ponds on a commercial basis. Production of minnows for bait is at present one of the few commercial applications in this field. From *FAO Fisheries Bull.*, 3 (4), 84 (1950).

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NATIONAL COLLEGE OF FOOD TECHNOLOGY TO BE ESTABLISHED IN GREAT BRITAIN

A National College of Food Technology is to be established in London in 1951. Negotiations by the Ministry of Education, Ministry of Food, and representatives of the various sections of the food industry have led to the development of plans for a college which will provide the food industry with training at a high level. This will include the handling, preservation, and processing of meat, fish, and other foods, as well as their derivatives and by-products. It will also deal with those branches of science most closely concerned with changes which take place in food during preservation and processing.

The college will operate on the principle that a sound basis for advanced technology is a good foundation of science coupled with industrial experience and it will draw its students from industry at an age beyond that of the usual college student; 23 or more years of age has been mentioned as the standard. Support of the project and the guarantee of a supply of students from their divisions of industry have been assured by the Food Manufacturers' Federation, the Institute of Meat, the National Federation of Fishmongers, and the Cooperative Wholesale Society.

The college will follow the pattern of other colleges set up for industries, including horology, foundry work, rubber technology, and heating, ventilation, and refrigeration.

As a temporary measure, the college will be housed within the premises of the Smithfield Technical College and some adapted premises in the near vicinity. Plans are being prepared to provide new quarters in the near future.—*Chem. Eng. News*, **29**, 392 (1951).

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PLANT TRIPS SCHEDULED FOR JUNE 21, 1951, DURING THE ELEVENTH ANNUAL MEETING OF THE IFT

Arrangements have been made for four plant trips for food technologists attending the Annual Meeting on June 17-21 at the Hotel New Yorker. There will be two trips in the morning and two in the afternoon on June 21. Members will be expected to make reservations and purchase tickets at the time of registration. With the exception of the visit to the U. S. Naval Supply Depot at Bayonne, for which the Navy is supplying transportation, all of the plants to be visited are within the metropolitan area and consequently we shall rely upon local means of transporation. At the time of registration detailed travel instructions will be issued to all those making reservations.

Thursday Morning, June 21

Trip A

The F. and M. Schaefer Brewing Co., 430 Kent Avenue, Brooklyn 11, N. Y.

TIME: 9:30 A.M. Visitors will be taken through the brewery and will follow the brewing operation from the raw materials to the finished beer, including mashing, fermentation and bottling.

Trip B

The Great A and P Coffee Division and Quaker Maid Factory No. 1, 45 Washington Street, Brooklyn, N. Y.

TIME: 9:30 A.M. Visitors will be shown the coffee roasting and packaging operation and also the manufacture of mayonnaise, salad dressing, peanut butter and preserves.

Thursday Afternoon, June 21

Trip A

General Foods Maxwell House Coffee Plant and Central Research Laboratories, Hoboken, N. J.

TIME: 1:30 P.M. Visitors will be shown through the Maxwell House Coffee Division Roasting Plant and following this will visit the Central Research Laboratories. This latter division of General Foods has facilities for work in the fields of food technology, chemical engineering, biochemistry, organic chemistry, and packaging.

Trip B

U. S. Naval Supply Depot and Commissary Research Division, Bayonne, N. J.

TIME: 1:30 P.M. Boarding a Navy vessel, the Food Technologists and their wives will view the famous skyline of lower Manhattan, travel close to the Statue of Liberty and Ellis Island, and move across New York Bay to the Naval Supply Depot at Bayonne, N. J., where the Commissary Research Division of the U. S. Naval Supply Research and Development Facility is located. From the dock, the

(Continued on page 4)

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Plant Trips Scheduled for June 21, 1951, During the Eleventh Annual Meeting of the IFT

(Continued from page 2)

group will be taken on a tour of the Naval Supply Depot, including a visit through a warship, and then will be shown the facilities of the Commissary Research Division. Transportation back to New York will be furnished.

OPEN HOUSE FOR VISITING FOOD TECHNOLOGISTS

A number of organizations in the New York area have set aside Thursday June 21st as Open House Day for food technologists attending the National Convention. It is requested that those interested in visiting these organizations make individual appointments, by telephone, on or before Wednesday, June 20th. The names of additional organizations desirous of having open house on Thursday will be posted near the registration desk during the convention.

THE FLEISCHMANN LABORATORIES: Mr. Robert F. Light (Melrose 5-4000).

FOOD RESEARCH LABORATORIES INC.: Mr. Jesse L. Weinberg (Stillwell 4-4814).

GOOD HOUSEKEEPING INSTITUTE: Miss Joan Henry (Columbus 5-7300, Ext. 742).

LABORATORY OF INDUSTRIAL HYGIENE: Miss Grace McGuire (Pennsylvania 6-5962).

MERCK AND CO., INC. (Rahway, N. J.): Miss A. Filios (Rahway 7-1200, Ext. 3160).

NATIONAL STARCH PRODUCTS INC.: Dr. T. A. White (Lexington 2-0060).

FOSTER D. SNELL INC.: Mr. Richard Moore (Watkins 4-8800).

The local arrangements subcommittee for plant trips is as follows: David Baldwin, Quaker Maid Factory (Great A and P Co.); John Bockelmann, The F. and M. Schaefer Brewing Co.; H. A. Campbell, General Foods Corp.; James C. Inghram, The Great A and P Coffee Div.; Ralph Kulerman, Thomas J. Lipton, Inc.; L. Allen Levenson, Naval Supply Depot; Lawrence Atkin, The Fleischmann Laboratories (Chairman).

RESULTS OF IFT NATIONAL OFFICERS' ELECTION ANNOUNCED

The Tellers Committee has just completed counting the ballots in the annual election of officers for 1951-52. A total of 1,404 ballots were cast, the largest number ever cast in any IFT election, indicating a healthy interest in the affairs of the Institute. The election results are as follows:

For President-Elect: Bernard E. Proctor

For Councilor-At-Large: LaVerne E. Clifcorn, Lloyd A. Hall, Ray B. Wakefield, George F. Stewart and Wm. B. Esselen

Charles N. Frey, President-Elect during 1950-51, will be President during the year 1951-52.

NEW CANNING PROCESS OF ANDERSEN'S FOODS, INC., RECEIVES FOOD ENGINEERING AWARD

To Andersen's Foods, Inc., Santa Barbara, Calif., goes the honor of winning the 1951 Food Engineering Award for outstanding achievement in food technology. The achievement which merits this distinction is the commercial application of a revolutionary pea soup canning process. It involves continuous sterilization of the soup at high temperature for a few seconds and continuous filling into sterilized cans under aseptic conditions. The Award is sponsored by the magazine, *Food Engineering*, (formerly *Food Industries*).

Robert T. Anderson, president of the company, will receive the Award Plaque at the forthcoming Eleventh Annual Meeting of the IFT in New York on June 19.

Selected by a committee of twenty-six well-known food technologists connected with universities and colleges, the winning process is of broad significance to the food processing industry and to food consumers. Applicable to many "flowable" foods, it is the method by which fresh milk is to be canned, and it is being used experimentally by a number of firms which make a wide variety of processed foods. Developed by W. McK. Martin, of James Dole Engineering Co., San Francisco, California, to protect the delicate flavor, color, texture and vitamin content of heat-sensitive foods, the process effects economies in fuel, water, floor space and labor.

FUTURE DATES FOR FOOD TECHNOLOGISTS

1951

June 17-20.	**Institute of Food Technologists. Eleventh Annual Meeting. Hotel New Yorker, New York, N. Y.**
June 27-29	National Pickle Packers Association. Midyear Meeting, Sheraton Hotel, Chicago, Ill.
August	World Poultry Science Association. Ninth Congress. Paris.
Aug. 2-Sept. 11	Eighth International Congress of Refrigeration. London.
Aug. 6-10	Food and Nutrition Sessions, Gordon Research Conference, AAAS. Colby Junior College, New London, N. H.
Sept. 8-13	XIIth International Congress of Pure and Applied Chemistry. New York, N. Y.
Sept. 26-29	International Association of Milk and Food Sanitarians. Glenwood Springs, Colo.
October	International Association of Ice Cream Manufacturers. Detroit, Mich.
October	International Canning Conference. Paris.
Oct. 1-3	Association of Official Agricultural Chemists. Shoreham Hotel, Washington, D. C.
Oct. 22-24	Packaging Institute, 13th Annual Forum. Hotel Commodore, New York, N. Y.
Oct. 24-26	National Pickle Packers Association, Annual Meeting, Sheraton Hotel, Chicago, Ill.
Nov. 5-8	Refrigeration and Air Conditioning Exposition, Navy Pier, Chicago, Ill.
Nov. 12-15	American Bottlers of Carbonated Beverages. Annual Meeting. Armory, Washington, D. C.

(Information concerning future dates of national and international meetings, conventions and exhibits of interest to food technologists should be sent to the editorial office.)

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The Institute of Food Technologists assumes no responsibility for statements in contributed articles appearing in FOOD TECHNOLOGY. Editorials present only opinions of the writers and do not necessarily reflect policies of the Institute of Food Technologists.

News of the Institute

1951 NICHOLAS APPERT AWARD TO A. E. STEVENSON

It is announced by the Chicago Section of the Institute of Food Technologists that A. E. Stevenson has been selected to receive the Nicholas Appert Award for 1951. This award is for outstanding achievement in the field of food technology. The award will be presented at the annual meeting of the Institute of Food Technologists in New York June 17-21, 1951.

Mr. A. E. Stevenson is Technical Assistant to the General Manager, Research Department, Continental Can Company, Inc. He is one of the country's leading specialists in the field of food canning technology. Born May 16, 1886, near Astoria, Illinois, he received his academic training ending in a B.S. degree in chemistry in 1912 at the University of Kansas, Lawrence, Kansas. During the past forty-one years he has virtually devoted his entire efforts toward scientific advancement in the fields of foods, drugs, and canning technology. Starting as a chemist for the Kansas State Board of Health in 1909, he became associated with the U. S. Department of Agriculture in 1915, doing food and drug work. In 1919 he joined the technical staff of the National Canners Association and remained there as chemist and canning technologist until 1926. He then joined the research staff of Continental Can Company, Inc., as Assistant Director in 1926 and was promoted in 1943 to the position he holds today.

Mr. Stevenson is an outstanding authority on the chemical relationship of foods to metal surfaces. His studies relating to discoloration in canned beets, preservation of color in canned peas, the effects of hard water in canning and others have all led to widespread practical application. His work on the chemical and the electrolytic treatment of tin plate surfaces has resulted in greater stain resistance, and the basic procedure is being utilized commercially to some extent. He also conducted extensive work over the years on the processing of foods and was the originator of an agitating type of process (shaker cooker) which is being used to a slight extent today. His recent discovery which established asparagus as an important source of relatively scarce rutin was timely and of significant value.

As a member of a technical advisory group to the War Production Board during World War II, Mr. Stevenson contributed greatly to the cause of tin conservation. He is still actively engaged in similar work in his own Company and through his position as Chairman of the Research Committee of the Can Manufacturers' Institute. He is also a director of the Associates Food and Container Institute, and is a Member of the Committee on Packing Packaging and Preservation, National Research Council Advisory Board on Quartermaster Research and Development. His corrosion and corrosion inhibitor investigations, unpublished except for three patents, have contributed greatly to the successful commercial preservation of foods in metal containers. His work on the National Canners Association Processing Commitee on Foods in Metal Containers has been effective and constant for many years.

Regional Section News

GREAT LAKES SECTION

April Food Technology noted the meeting to be held April 20th at the General Electric Lighting Institute, Nela Park, Cleveland, Ohio. This was the first meeting held in Cleveland since the founding of the Section in November, 1944. Following are the papers presented:

"Spice Flavoring" by Joseph A. Adams, Joseph Adams Co., Cleveland.

"Air Sanitation with Ultra Violet Light" by L. J. Buttalph, Head of Health Application of the G. E. Division Lamp Department, General Electric Co., Nela Park, Cleveland.

In the evening, Miss Jean Brown-Sanders, formerly with the British Malayan Forces, spoke on "Primitive Cooking." She was followed by an Auditorium presentation: "New Horizons of Lamp Research." Evening dinner was served in the Manager's Dining Room, compliments of the G. E. Lamp Department. As reported in April issue, the Section visited the Envoldsen Shrimp Co. and were the guests of Karl Envoldsen, company head and IFT member. "You can eat all the shrimp you want," Karl told his visiting fellow members as they toured his immaculately clean and orderly plant which was replete with evidence of his technological genius and perfectionism. This tour took place in the morning.

PHILADELPHIA SECTION

The Section's April meeting was held on the 12th, taking the form of a dinner and later session at the Drexel Institute of Technology in the Men's Faculty Club. Speaker for the occasion was Dr. William Ball, Department of Biological Sciences at the Drexel Institute; his subject: "Insecticides."

INDIANA SECTION

Here are a few notes to bring us up-to-date on the activities of the latest addition to the IFT Family—the Indiana Section of the IFT. The February issue of Food Technology reported the list of officers. The third meeting of the group was held on January 9th in the Hotel Antlers in Indianapolis at which the speaker was Dr. N. W. Desrosier of Purdue University and the subject: "The Proposed Food Technology Curriculum at Purdue." Then came the meeting of March 6th at the Hotel Warren in Indianapolis at which the Presentation of the Regional Charter in the IFT to the IAFT took place. Here's what G. H. F. Schnakenberg of Eli Lilly and Co. of Indianapolis and secretary-

(Continued on page 10)

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Regional Section News

(Continued from page 8)

treasurer of the Section says of the Presentation in his April newsletter:

"Our fourth meeting was held in the Hotel Warren on Tuesday, March 6, 1951, and was truly a memorable one. Before some 50 members and distinguished guests, Dr. Paul Sharp, National President of the Institute of Food Technologists, presented the Indiana Association of Food Technologists its charter as the twentieth Regional Section of IFT. The occasion was unique in the annals of IFT history because it was the first time a regional section charter has ever been presented to a section by the National President. We are proud and honored. Dr. Sharp treated us with facts and figures dealing with the contributions of Food Technology to the National Economy in the past and reminded us of our responsibilities in the future as Food Technologists.

"What Dr. Sharp may have failed to mention, our second distinguished guest, Col. Charles Lawrence, Executive Secretary of the IFT, covered very well, running his usual gamut from the superiority of the female intellect to gossypol and K rations. Col. Lawrence highlighted his remarks with some sound advice to the fledgling section which was carefully noted.

"We were also very fortunate to hear from another well known figure, H. Frederick Wilkie, president of Kingan and Company, who reminded us that with the formation of the section, our responsibilities as Food Technologists have just begun, 'we have arrived' but only at the starting point.

"W. C. Kruger, vice president of Stokely-Van Camp, Inc., felt that the new organization could be of great value to the production men in the food processing industries and that their participation in our activities should be encouraged.

"William Butterfield of the Indiana Canners Association conveyed their well wishes and congratulations which were heartily seconded by Al Dryer.

"A genuine spirit of enthusiasm and encouragement pervaded the meeting and we wish to thank the many well-wishers, especially charter member W. R. Lalor, now at the University of Michigan (formerly bacteriologist with Quaker Maid Co., Inc., Terre Haute, Indiana) for his 'sharp' telegram of congratulations, and, the send-off from the Stange group.

"We are under way—let's keep rolling."

To wind up this news item, suffice it to say that the Hotel Warren in Indianapolis was the meeting place for the May get-together, taking place on the first of that month. Dr. Lee Truman of Pest Control Services and Mr. Sherman Ward of Stokely-Van Camp discussed "Plant Sanitation" while Mr. V. R. Rupp of Kingan and Company spoke on the "Curing of Meat."

FLORIDA SECTION

The Section held its April meeting on the 25th of that month, taking the form of dinner session at the Crystal Ball Restaurant in Tampa, Fla. Speaker for the occasion was Dr. L. D. Batchelor, Citrus Experiment Station, University of California, Riverside, Calif. His topic: "Some Problems Facing the Citrus Industry in California." Dr. Batchelor has been director of the California Citrus Experiment Station since 1929, and has had a hand in editing the well-known books, The Citrus Industry, the 3rd volume of which is in preparation.

NORTHERN CALIFORNIA SECTION

On April 12th, the International Minerals & Chemical Corporation of San Jose, Calif., played host to the members of the Section, arranging a plant tour and providing refreshments and dinner, the latter taking place at the Hawaiian Gardens.

According to the March-April issue of *The Hornblower,* official mouthpiece of the Section, the group cannot accept any more additional Regional Associate Members. This is because the charter under which the Section operates from the national IFT forbids more

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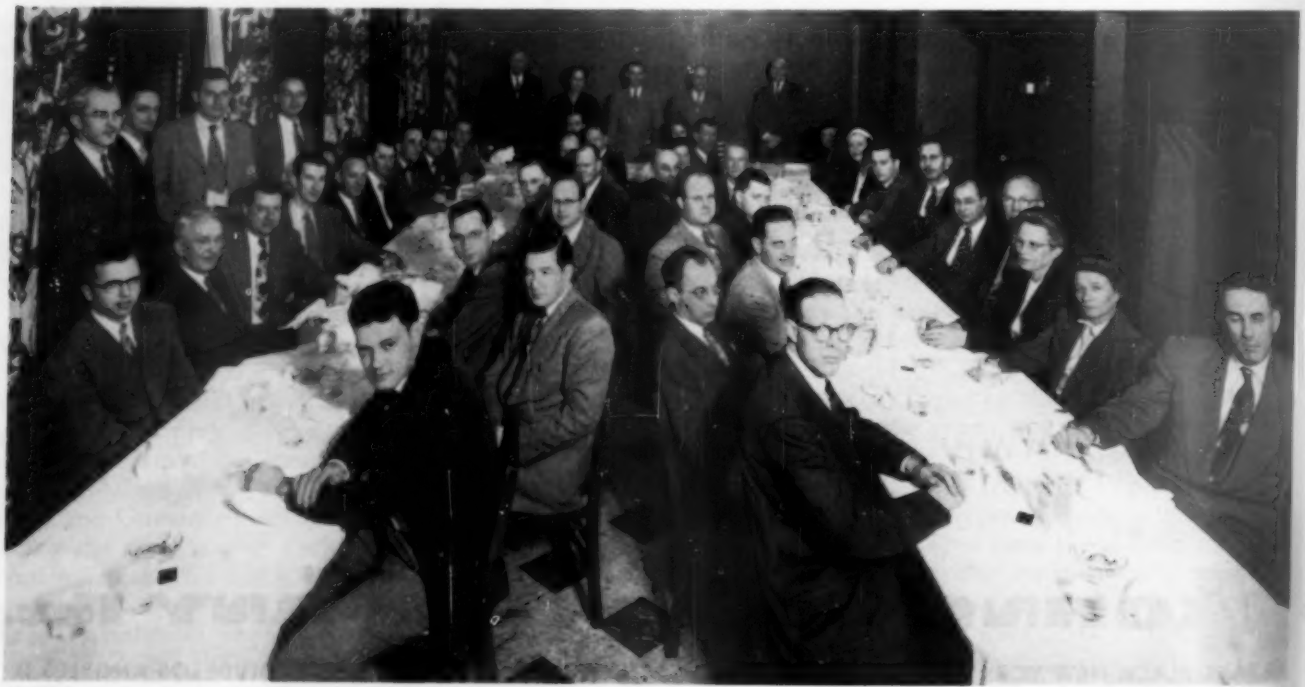

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Regional Section News

(Continued from page 10)

than 25 percent Regional Associate Members on the membership rolls of any section. "We have now reached the 25 percent figure," the report says.

PERSONNEL

WILLIAM L. CAMPBELL, Head, Department of Food Technology, MIT, Cambridge, Mass., has been appointed Vice-president of the Food Machinery and Chemical Corporation at San Jose, California.

R. ADAMS DUTCHER, Head of the Department of Agricultural and Biological Chemistry and Chairman of the Council on Research at the Pennsylvania State College, will retire on July 1, 1951, to devote full time to technical writing and consultation work on foods and nutrition. He has served as Head of Department since 1921.

KIRBY M. HAYES, formerly Food Technologist with the Poultry Branch, P. M. A., U. S. Department of Agriculture, Washington, D. C., has been appointed Associate Extension Professor, Department of Food Technology, University of Massachusetts, Amherst, Mass.

RICARDO MILLARES, formerly associated with the Instituto Mexicano de Investigationes Technologicas, has been appointed Technical Director of Maiz Industrializado, S. A. of Mexico 10, D. F. Dr. Millares is a member of the IFT.

DONALD M. SWARTHOUT, formerly Assistant Field Manager for the California Walnut Growers Association, has been appointed Director of Research for that organization. The new department, headed by Mr. Swarthout, will conduct continuous research into walnut processing, preservation, and packaging.

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PREVENTION OF EXTERNAL RUSTING OF FOOD CANS: SUMMARY OF RECOMMENDED PRACTICES

Within the limits of commercial manufacture, the tin coating on tin plate even when at the maximum so far as weight or thickness of coating is concerned, does not afford an absolute protection against external rusting under unfavorable conditions. Therefore, the canner cannot rely on tin coating alone to prevent rusting of cans but must take reasonable precautions to protect the cans from those conditions which are conducive to exterior rusting. As the tin coating on cans is decreased these precautions become increasingly important. Some of the more important of these precautions are listed briefly:

1. Avoid abrasion of the tin coating or outside enamel in can trucks, runways, twisters, retorts, cooling canals and can unscramblers.
2. Avoid excessively sharp and deep code embossing. Be sure male and female type are in exact alignment.
3. Wash sealed cans immediately after closing to remove salt or acid brines from exterior surfaces. Avoid excessively high concentrations of alkaline detergent solutions in washing grease from sealed cans, and rinse cans in fresh water immediately after such detergent sprays.
4. Vent the air from steam retorts and completely at the beginning of the process.
5. In boiling water processes make certain that the water is at the boiling point, not merely "rolling."
6. Apply chemical treatment to cooling water that is acid, saline or heavily charged with air.
7. Leave just sufficient heat in the cans after water cooling to dry all residual moisture from their surface before casing.
8. Do not case tins that are wet or allow water to remain on them for extended periods. Cooling water must be drained from the cans promptly and thoroughly. The use of an air or steam blast to remove excess water from the tops is advisable.
9. Provide dry and sheltered storage space for both filled and empty cans. Do not store covers on the canning room floor. Cover unprotected cans with a tarpaulin or heavy paper.
10. Prevent the sweating of filled and empty cans by avoiding sudden changes in warehouse temperatures and by proper ventilation to maintain uniform low humidities.—(From a booklet entitled "How to Obtain Best Service from Food Cans," published by the Can Manufacturers Institute, Washington, D. C., March, 1951.)

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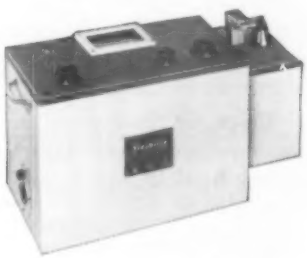

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FOOD TECHNOLOGISTS HONOR DEAN PRESCOTT

Dr. Samuel Cate Prescott, former Dean of Science at Massachusetts Institute of Technology, has been chosen as 1951 recipient of the Stephen M. Babcock Award of the Institute of Food Technologists. This Award, which includes a cash prize of $1,000 contributed by the Nutrition Foundation, Inc., is made annually to a person who has distinguished himself by contributions in the field of food technology resulting in improved public health through some aspects of nutrition or more nutritious food. The presentation will be made to Dr. Prescott at the forthcoming Eleventh Annual Meeting of the IFT in New York.

Dr. Samuel Cate Prescott

Among the achievements for which the recipient of the current award is famous is his work of a half century ago on the relation between chemical spoilage of canned foods and the growth of microorganisms. This led to improved heat-processing techniques in the canning of food, which greatly reduces losses due to spoilage. Dr. Prescott has been active in the sanitary field and was a pioneer in the use of chemistry and bacteriology for the development of a safe milk supply. His work on the chemistry of coffee has gained wide renown. He developed processes for dehydration of foods and subsequently became interested in low-temperature preservation, for which he achieved international recognition.

Dr. Prescott was born at South Hampton, N. H. in 1872. Most of his scientific work was done at or through Massachusetts Institute of Technology, with which he was actively connected for over 50 years. He held a commission in the Sanitary Corps Reserves of the Army, reaching the grade of Colonel before his retirement. In recent years he was consultant to the Secretary of War on subsistence.

BULLY BEEF FROM THE BOER WAR

The recent opening in Melbourne of a can of corned beef issued as rations to Mr. V. H. Payne, a soldier of the Boer War, in 1899, supplied additional evidence of the remarkable keeping qualities of some of these early packs. The bully beef had been packed by Armour & Co. at their Chicago or Kansas City plants. The can was hand made and heavily soldered.

The can was opened and examined by Mr. B. V. Heath, Technical Secretary of the Food Technology Association of Victoria, Australia. Analyses were made of the head space gas and of the can contents. A bacteriological examination was also made.

Before giving details of this examination it will be of interest to describe two other early meat packs which have been examined:

Roast Veal, 1824. This was packed in a hand made container and was prepared by Donkin and Gamble, London, for Parry's expedition to the Arctic. It was opened and examined in 1938 by a committee of food scientists in London.

Tripe, 1880. Packed in a can resembling the modern sanitary container. This was opened by the same committee in 1938.

RESULTS OF EXAMINATION

	Veal (1824)	Tripe (1880)	Beef (1889)
Headspaces gases			
Hydrogen, %	85.5	13.6	90
Carbon dioxide, %	7.2	2.5	trace
Oxygen, %	0.2	0.3	....
Nitrogen, % (by difference)	7.1	83.6	10
Metallic contamination			
Iron, p.p.m.	71	539	....
Lead, p.p.m.	3	nil	nil
Tin, p.p.m.	783	163	80
Zinc, p.p.m.	27	11	....
Bacteriological examination:	Doubtful	Sterile	Sterile
Free fatty acids (Saponification value of fat)	81	....	19

It is apparent that hydrogen has been evolved in all cases by reaction with the metal of the can, which had suffered severe corrosion. Sulphide blackening had occurred in each pack. The bacteriological and general condition of these packs was good, apart from sulphide blackening. Feeding tests on animals had no ill effects. The fat had saponified to a large extent but this in itself does not render the packs inedible. Modern cans are made of much thinner plate and it is very unlikely that they will achieve such longevity as these veterans of the 19th century.

Mr. Heath is to be congratulated on his enterprise in obtaining possession of the can of Boer War corned beef and making the results known. [From *Food Technology in Australia*, **2** (12), 264 (1950).]

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Write to nearest regional secretary, if within an area covered by a regional section, or to the Executive Secretary of the Institute, for an application form and information regarding qualifications and classifications.

GUIDE PUBLISHED FOR THE USE OF CANNED FOODS IN EMERGENCY FEEDING

The immediate availability of a safe, uncontaminated food supply would become an absolute necessity for civilian survival in the case of an atomic bomb attack, or under conditions of biological and chemical warfare. The feeding of the unevacuated people under such emergency and the satisfaction of their needs for drink would be second in importance only to that of medical care.

Under atomic bomb attack food must be protected against "residual" radiation from "radioactive dust." Food in cans, glass jars, or other completely sealed packages, would be safe if the packages had not been broken open by the blast or the fire that follows. Other foods, unprotected from radioactive contamination, may be dangerous and unfit for consumption unless proven to be safe by a radiation detecting instrument. The rigidity of canned foods containers, along with hermetic seal they provide, makes this form of food the most likely to escape the dangers of the blast, fire and contamination.

A leaflet entitled "Guide for the Use of Canned Foods in Emergency Feeding" published recently by the Home Economics Division of the National Canners Association, Washington, D. C., discusses the various factors which are involved in emergency feeding. After a brief discussion of emergency food requirements and the storage of food supply for the emergency, the leaflet discusses the significance of unemotional planning of food supplies and the precautionary measures which have to be taken with food supplies in case of atomic attacks and in biological and chemical warfare. Reprints of this leaflet are available upon request from the Home Economics Division of the National Canners Association, Washington, D. C. The leaflet also contains a list of selected source material for further information on this subject. (ZIK)

INDIA'S CANNED FRUIT INDUSTRY

India's preserved fruits industry, sheltered by tariff protection and enjoying the advantages of drastic import control, is struggling to establish itself. The industry now produces canned and bottled fruits, fruit juices and squashes, jams, jellies, and marmalades as well as candied and crystallized fruits. The number of fruit canning establishments in the country increased from 295 at the end of 1948 to 449 at the end of 1950. The Ministry of Agriculture estimates that the total production of canned fruits and vegetables in the licensed factories in 1950 was about 6,700 tons; of this preserved fruits formed about 50%.

The defense departments purchase all their requirements of preserved fruits from the Indian industry, amounting to 22% of its entire output. As regards fruit squashes and juices, forming 70% of the entire output of the industry, the country is not only self sufficient, but has a surplus for export.—[From *Food Manufacture*, 26, 170 (April 1) 1951.]

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(This advertisement originally appeared in full-color in TIME, BUSINESS WEEK and FORTUNE.)

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If you are a food packer, you will find that the quality and scope of our research service are major reasons why so many people like to do business with Continental Can Company. Our one goal is to lick packing problems of all kinds.

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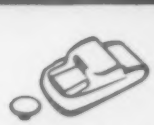
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Book Review

MACARONI PRODUCTS — MANUFACTURE, PROCESSING AND PACKING. By Charles Hummel, 223 pages. Food Trade Press Ltd., London, 1950. Price $6.20.

This is a fairly complete treatise on macaroni products which should be of interest both to food technologists in general and to macaroni and noodle processors in particular. For the first time to my knowledge, a comprehensive book has been published on the above products in the English language and Dr. Hummel has presented the material in a clear, concise manner. Stress is placed on the manufacturing and drying aspects in which there is shown the development from the old batch process of manufacturing to the new continuous automatic presses and driers. The photographs illustrating the different operations are well selected and depict the various essentials discussed. The table of contents is complete and the physical format and printing should be quite acceptable to the reader.

The author has particularly well described the macaroni presses which are being utilized throughout the world and has developed the principles underlying the construction and operation of the various types. The section on drying is especially important to technical men in the food industry and Dr. Hummel's treatment of the theory of drying deserves commendation.

In discussing the feeding of farinaceous material in the continuous presses, the author apparently is not aware of the fact that in the U. S. the volumetric flow is being gradually replaced by the gravimetric flow through the use of the Merchen Scale Feeder. This promotes better accuracy in the feeding of the raw material into the mixer. The author has also neglected to refer to some publications which have been published in *Cereal Chemistry* and *Food Industries* wherein different phases of macaroni manufacturing and testing have been presented. Also, it would have been advisable to have consulted a volume in French by Ch. Renaudin entitled "La Fabrication Industrielle des Pâtes Alimentaires, published in 1946. In addition, the author has not discussed the significance of sanitation in the modern manufacturing process. It is to be hoped that a new edition of this useful book will incorporate an adequate treatment of the above subjects.

Despite the limitations noted, Dr. Hummel has rendered an excellent service in bringing to the English-speaking peoples this technical book on macaroni and noodle manufacturing with the emphasis on the various types of machinery used for each phase of the processing.

JAMES J. WINSTON.

METHODS OF VITAMIN ASSAY. Prepared and edited by the Association of Vitamin Chemists, Inc. 301 pages. Interscience Publishers, New York, 2nd ed. 1951. Price $5.50.

This edition, the second, which represents the efforts of 41 persons aided by a board of 38 reviewers, is considerably better than the first, which appeared in 1947. The chapters dealing with methods for vitamin A, carotene, ascorbic acid, thiamine, riboflavin, and niacin have been revised to include some of the more recent developments, as, for example, the indophenol-xylene extraction method for ascorbic acid and a chemical pro-

cedure for niacin. New material includes procedures for pantothenic acid, pyridoxine, folic acid, biotin, and vitamin B_{12}. In the chapter on sampling, the discussion on statistics has been expanded and improved thereby. Many analysts wise in the ways of the chemist, when confronted with the necessity for close cooperation with a "bug" to achieve a quantitative vitamin assay, find themselves baffled by these "bugs." Particularly helpful, then, will be the new chapter on microbiological assay technics.

To some, the many details of procedure will seem superfluous, and to others the scope of the book will appear limited. It was prepared, however, primarily for the laboratory technician with limited training in quantitative analysis, and only methods which have been successfully applied to a variety of materials by several committee members have been included. The bibliographies concluding all but one of the fifteen chapters, while not exhaustive, will prove helpful to those desiring further information.

The quality of printing and binding is good and the subject matter is arranged for easy reading.

Neither this book nor any other will transform a poorly-trained technician into a good analyst. It should, however, help in achieving reliable results in many instances and for this the many persons involved in the preparation of this volume deserve a vote of thanks.

GORDON H. ELLIS.

GERMAN CANNED MEAT EXPORTS

The first important post-war export shipments of German canned meat have now been made. Although a few small deliveries had been made earlier to foreign customers under barter arrangements, it was not until the end of 1950 that the first large export contracts, covering the delivery to Britain of 600 tons of canned hams and canned shoulders, were included. Further shipments can be made as the German Food Ministry has already freed additional quantities for export.

German meat canners are particularly keen to obtain foreign orders in view of the fact that domestic sales are insufficient to enable them to operate at full capacity. Moreover, export sales are made almost exclusively in high quality, relatively expensive products, and the proceeds can be used to import lower quality meat products which have a larger sale on the domestic market. Really large-scale export business, however, can be expected only when shipments to the U. S. are resumed.—(From *Food Manufacture*, **26**, 127, March 1, 1951.)

PAKISTAN SUGAR MILL OPENED

Described as the biggest sugar mill in Asia, the Premier Sugar Mills recently opened at Mardan by Khwaja Nazimuddin, Governor-General of Pakistan, are expected to be able to produce 50,000 tons of sugar per annum when operations are in full swing.

During his speech, the Governor-General stated that there was further scope for the establishment of sugar mills in the country. The Government has given permission for the establishment of a sugar mill in Bahawalpur State, and the question of establishing another mill in Thal Area in the Punjab was under consideration.—(From *Food Manufacture*, **26**, 127, March 1, 1951.).

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TECHNICAL ASSISTANCE IN AGRICULTURAL STATISTICS

The improvement of agricultural statistics continues to be a major item in FAO's program of work. Training centers in the Near East, Far East, Europe, and Latin America have chiefly been oriented to meet the needs of member governments planning a census of agriculture in or about 1950. The work program each year has also included consultation with member governments on problems concerning national statistics in food and agriculture.

Under the Expanded Technical Assistance Program, more adequate assistance to governments can be provided than has been possible heretofore. Requests already received from governments indicate that such assistance is likely to take one of three major forms: (a) training centers; (b) consultants who will visit countries for a relatively long period of time; and (c) fellowships. It is visualized that through a combination of these three, many countries which desire to improve their agricultural statistics will be enabled to move toward this objective.

The first activity to begin under this program is the Latin-American Training Center for Agricultural Statistics, currently being conducted in San José, Costa Rica. This center, which is expected to be in operation for approximately three months, will offer classroom and practical work covering the following subjects: review of basic mathematics and statistics, agricultural statistics, crop reporting, sampling, and agricultural economics. Student delegates from 12 Central and South American countries are taking part in the center. These students are recruited primarily from government bureaus dealing directly with problems of current agricultural statistics. The staff members for the center come from Canada, the United States of America, China, Colombia, and Costa Rica. A number of fellowships providing for a year's additional training in agricultural statistics outside the recipient's home country will be awarded at the close of the center.

Training in statistical procedures is also visualized as a part of the curriculum to be offered in training centers under consideration for Asia and Latin America in connection with the development of agricultural plans and programs.

Requests have been received from six countries in the Near East, Far East, and Latin America for nine statistical consultants to assist in the development or improvement of programs for current agricultural statistics. The consulting program is being developed in close co-operation with similar programs of other agencies, particularly those of the United Nations and the Inter-American Statistical Institute. FAO, in like manner, is co-operating in the training institute now being conducted in Calcutta under the auspices of the International Statistical Institute. (From FAO *"Food and Agricultural Statistics.* IV (2-3), February-March, 1951.)

Selected Abstracts

ANALYTICAL METHODS

Spectrophotometric assay of ascorbic acid with peri-naphthindanetrione hydrate.

EL RIDI, M. S., MOUBASHER, R., AND HASSAN, Z. *Science, 112,* 751-2 (1950).

Peri-naphthindanetrione hydrate reacts with ascorbic acid giving a reddish color. The amount of reduction color produced follows Beer's law, and may be measured at 475 mμ.

Spectrophotometric determination of vitamin-A.

MARJANI, A., AND GAUDIANO, A. *Atti Acad. naz. Lincei, 8,* 43 (1950); *Brit. Abst., C, 456,* No. 3680 (1950).

The Morton and Stubbs method of determination of vitamin A which is based on the measurement of the absorption of light by the vitamin and also permits the identification of accompanying substances, is examined. It is found that even when working most accurately, errors may be incurred which may reach even high values. The authors suggest certain alterations in the methods of measurement and give corrected formulae.

Measurement of color changes in foods.

EASTMOND, E. J. *Advances in Chemistry Ser., 3,* 3-12 (1950); *Chem. Abst., 45,* 271e (1951).

Spectrophotometric methods are described for determining the extent to which original color is retained in processing and subsequent storage of foods. Color differences are measured by reflectance spectrophotometry and photoelectric colorimetry and expressed as differences in psychophysical indexes such as luminous reflectance and chromaticity. In turn, these can be converted to the more descriptive terms of Munsell, hue, value, and chroma, where color charts can be used for direct evaluation of the results.

An electronic recording analytical balance.

LOHMANN, I. W. *Rev. Sci. Instruments, 21,* 999-1002 (1950).

An electronic recording analytical balance is described which is free of mechanical connections with the balance beam, direct reading, sensitive, and rapid. All mechanical and electric contactors have been eliminated from the instrument proper, using electronic means as a substitute for mechanical. A relay and two cam-operated microswitches are, however, used in the range extender. The construction is simple, being made up, for the most part, of available standard commercial units. For work requiring a continuous record of changes in weight with respect to time, the instrument should prove to be most valuable.

BIOLOGICAL SCIENCES

BIOCHEMISTRY

Histologic findings in rats subjected to prolonged administration of para-aminobenzoic acid.

UPTON, A. C., AND ZARAFONETIS, C. J. D. *Proc. Soc. Exptl. Biol. Med., 75,* 450-2 (1950).

In doses greatly exceeding the usual therapeutic range for man, PABA is relatively non-toxic for the rat. Aside from histological alteration in the thyroid gland, no significant pathologic changes were detected in the treated animals or their offspring. Thyroid changes were reduction in amount and eosinophilia of intrafollicular colloid associated with epithelial hypertrophy and hyperplasia. No hepatotoxic effect detected.

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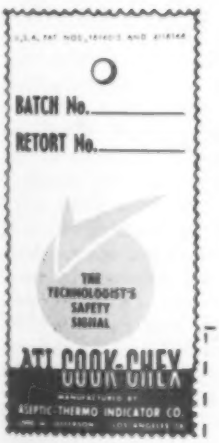

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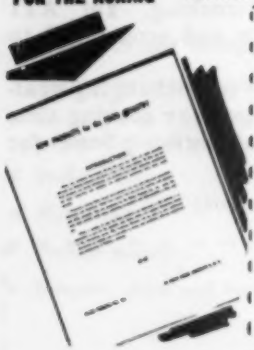

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FT651

Abstracts

The effect of 2,4-D on potassium nitrate levels in leaves of sugar beets.

STAHLER, L. M., AND WHITEHEAD, E. I. *Science, 112,* 749-51 (1950).

It is suggested that livestock losses following the grazing of 2, 4-D-treated weeds may have been due to KNO_3 poisoning. When sugar beet leaves were sprayed with 2, 4-D the KNO_3 level was raised to a larger concentration. Potassium nitrate is changed into nitrites in the animal body as a result of the action of micro-organisms in the rumen and causes formation of methemoglobin in the blood stream which may cause death in a few hours.

Fat emulsions for oral nutrition. II. Failure of phosphatide, Tween 80, or choline to influence fat absorption.

SHOSHKES, M., GEYER, R. P., AND STARE, F. J. *Proc. Soc. Exptl. Biol. Med., 75,* 680-3 (1950).

Excess amounts (greater than needed for excellent emulsions by mechanical means) of soybean phosphatides or Tween 80 did not affect absorption of orally fed corn oil. The absorption of the corn oil by choline deficient rat was similar to the absorption of the normal rat. Large amounts of soybean phosphatide, Tween 80 or choline did not affect the absorption of corn oil in the rat intestine ligated below the pancreas and at the ileocecal junction.

Autolysis products of pepsin.

INGRAM, V. M. *Nature, 167,* 83 (1951).

Pepsin is autolyzed by heat at 45° C. at pH 4. Tyrosine precipitated out. Material is dialyzed and dialyzed mother liquor investigated by paper chromatography. 34 Ninhydrin positive substances were found.

MICROBIOLOGY

Slow cathode rays on microorganisms.

MOOS, W. S. *Nucleonics, 8,* 50-3, Jan., 1951.

The influence of very slow electrons (of 1-8 kev range) on *Pseudonomas aeruginosa* has been studied. Results show a maximum effect of the electrons at a voltage that gives them a penetration in depth corresponding to the cell diameter.

NUTRITION

Effect of heat on the nutritive value of proteins.

GRISWOLD, R. M. *J. Am. Dietet. Assoc., 27,* 85-93 (1951).

Moderate heating of raw soybeans increases their digestibility and biological value and makes the cystine and methionine which they contain more available in metabolism. Raw soybeans contain several heat-labile factors which inhibit growth and the proteolytic effect of trypsin. Egg white contains a trypsin inhibitor, the protein ovomucoid, which is inactivated by heating. Home cooking methods have little effect on the amino acid composition of meat, but may decrease the biological value of the protein slightly. Excessive heat lowers the nutritive value of meat protein, probably by forming enzyme-resistant linkages. Overheating casein makes enzymatic release of its lysine difficult. Lactalbumin is also damaged by overheating, especially when lactose is present. However pasteurizing, evaporating, canning, or cooking milk has little effect on the nutritive value of its proteins. Some damage to the proteins may occur in drying milk and in storing dried milk. The nutritive value of the protein of cereals is not damaged by cooking with water, but is lowered by toasting, as in processing flaked or puffed cereals.

Observations on aureomycin and APF for the pig.

EDWARDS, H. M., CUNHA, T. J., MEADOWS, G. B., SEWELL, R. F., AND SHAWVER, C. B. *Proc. Soc. Exptl. Biol. Med., 75,* 445-6 (1951).

Pigs fed aureomycin and those on APF supplements had more bloom and smoother coats than those on basal ration plus B_{12}. 1% APF supplement plus aureomycin was not better than 1% APF supplement alone in diet. 3% APF caused better increase in rate of gain than 1% APF or 1% APF plus aureomycin. Indication is that APF supplement No. 2 at 3% level was caused by some factor or factors other than vitamin B_{12} and aureomycin.

The nitrogen-sparing effect of dietary carbohydrate in its relation to the time factor. Experiments with repletion of protein-depleted adult rats.

GEIGER, E., BANCROFT, R. W., AND HAGERTY, E. B. *J. Nutrition, 42,* 577-85 (1950).

Using protein-depleted adult rats, the effect of the time factor in the feeding of protein and carbohydrates showed that the N retention and growth of the rats which received protein and sugar simultaneously was considerably higher than that of rats which received these 2 food substances separately.

Artificial enrichment of white rice as a solution to endemic beriberi. Report of field trial in Bataan, Philippines.

SALCEDO, JR., J., BAMBA, M. D., CARROSCO, E. O. et al. *J. Nutrition, 42,* 501-23 (1950).

The substantially exclusive use of enriched rice by 63,000 people in Bataan since Oct. 1. 1948 indicates, by clinical examinations, a decline of 76 to 94% in the incidence of beriberi. By contrast, in an adjacent control area the incidence rose somewhat during the same period. The beriberi mortality also declined from 263 per 100,000 to 28 per 100.000 during the field trials. In addition, infantile beriberi mortality declined 53%.

Supplementation of wheat with amino acids in the diet of the chick.

MARCH, B., BIELY, J., AND TONZETICH, J. *J. Nutrition, 42,* 565-75 (1950).

The effects of supplementation of all-wheat diets with lysine, methionine, tryptophan, and fish meal have been studied with regard to growth rate and feed ultilization in the chick. The addition of lysine to an all-wheat ration increased the growth rate of chicks and improved the efficiency of feed utilization. Lysine in excess of the optimum level for the particular amino acid composition of the ration, decreased both the growth rate and the feed utilization efficiency. The addition of methionine or tryptophan to an all-wheat ration depressed the efficiency of feed utilization.

Sodium values of a selected group of foods.

IRWIN, L. B., AND SCHUCK, C. *J. Am. Dietet. Assoc., 27,* 98-100 (1951).

The sodium and potassium requirements of the rat for growth.

GRUNERT, R. R., MEYER, J. H., AND PHILLIPS, P. H. *J. Nutrition, 42,* 609-18 (1950).

The growth requirements of a rat for sodium was 0.05% and was independent of the potassium content within limits of 0.25 to 1.0% potassium. The potassium requirement was 0.18% in the presence of 0.1% sodium. A high level of sodium (1.0%), reduced the potassium requirement to 0.15%. It was also found that the potassium requirement decreased progressively with increase in age during the six week period. In contrast, the sodium requirement remained relatively constant.

PHYSIOLOGY

Toxicologic studies of compounds investigated for use as inhibitors of biologic processes. III. Toxicity of propylene glycol dipropionate.

AMBROSE, A. M. *Ind. Hygiene Occupational Medicine, 3,* 48-51 (1951).

Studies of rats inhaling air laden with propylene glycol dipropionate (PGDP) have shown that the material is nontoxic by inhalation. Male rats maintained for approximately 232 days on diets containing 0.04% through 0.32% of PGDP exhibited no appreciable ill effects as determined by gross observations, growth, food consumption and histopathological examination of organs. With higher concentrations (0.64 to 2.56%) in

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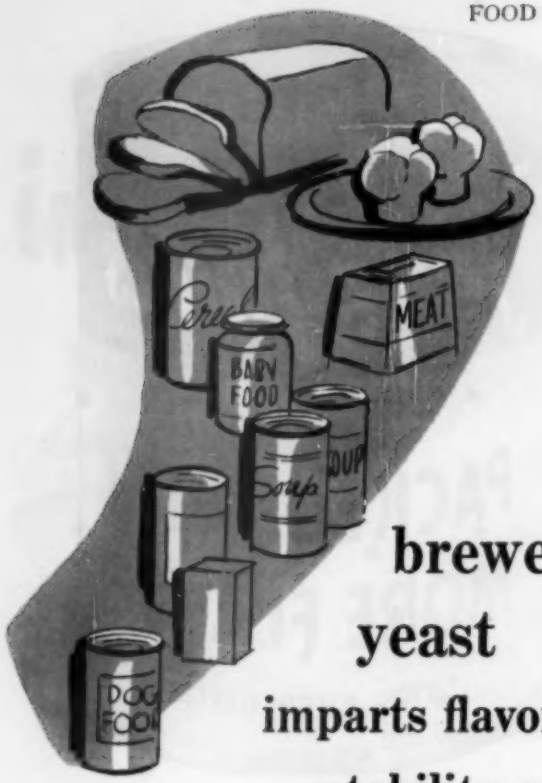

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Abstracts

the diet, growth was not proportional to the PGDP in the diet. It is concluded that no significant health hazards are involved in the handling or the ingestion of propylene glycol dipropionate within reasonable limits.

Effect of coffee on sport performance.

EICHLER, O. *Arch. exp. Path. Pharmak, 206,* 251-7 (1949); *Brit. Abst. A III,* 954 (1950).

Athletes received a drink (coffee) containing either 0.25 g. of caffeine or no caffeine before taking part in a 100-m. run, long jump, and shot put. The effect of the caffeine on performance was significant for 2 hours after drinking the coffee.

Allergic manifestations to agar.

CRIEP, L. H., AND RILEY, W. K. *J. Am. Med. Assoc., 145,* 485-6 (1951).

A case of occupational allergy to agar is reported. The properties, industrial uses and possible clinical significance of agar are reviewed.

The intravenous toxicity of sodium bisulfite.

HOPPE, J. O., AND GOBLE, F. C. *J. Pharmacol. Expll. Therap., 101,* 101-05 (1951).

The comparative acute intravenous toxicity in mice of sodium bisulfite in distilled water and in 6% protein hydrolysate was found to be 130 ± 8 and 130 ± 10 mgm./kgm., respectively. Sodium bisulfite appeared to be twice as toxic for rabbits as for mice, while the susceptibility of rats and hamsters was intermediate between these two species. Two-thirds of the approximately LD_{50} for rabbits was injected intravenously three times daily, five days a week for three weeks without apparent toxic effect. Aqueous solutions of sodium bisulfite rapidly increased in acidity and acquired a strong odor of SO_2 on standing whereas no significant change in pH was observed with similar concentrations in protein hydrolysate over a period of three weeks. Severe vascular irritation resulting in thrombus formation was observed with aqueous solutions of sodium bisulfite in rabbits while the protein hydrolysate bisulfite solutions were found to be non-irritating. No evidence of cumulative toxicity by intravenous injection of sodium bisulfite, either in distilled water or in protein hydrolysate, was observed in a subacute toxicity study in rabbits. Gross and microscopic pathological examination of the heart, lungs, liver, spleen and kidneys revealed no tissue changes attributable to the intravenous administration of sodium bisulfite to rabbits at total daily doses up to 120 mgm./kgm., five days a week for three weeks.

FOOD PRODUCTS

Basic behavior at freezing and thawing of six foods.

NICHOLAS, J. E., AND PERRY, J. S. *Agr. Eng., 32,* 102-05 (1951).

In the freezing of a fresh fruit or vegetable, the cooling curve will show a rise in temperature from an arrest point presumably because of crystallization of sugars, or other dissolved substances in the juices. Characteristic freezing and thawing rates were recorded for raspberries, strawberries, grapes, plums, lima beans and peas. Unusual behavior on the part of fruits and vegetables before crystallization was noted. All products supercooled to much lower temperatures than those at which freezing began. The lowest point of arrest noted was 11.9° F. found in a pea, which subsequently rose to 27° F. before cooling to the freezing air temperature. After an arrest or eutectic point was reached, the temperature to which the product warmed appears to indicate its freezing temperature. These studies show that freezing of unwrapped products exposed to low temperatures without air motion is rapid. This principle may have industrial application when large quantities of foods are to be frozen. When soluble materials are frozen out of solution, the crystallization process is exothermic as indicated by a rise in temperature. From the studies of this series, it was not possible to differentiate freezing by convection from freezing by radiation.

Storage changes in frozen concentrated citrus juices. Preliminary report.

MOORE, E. L., HUGGART, R. L., AND HILL, E. C. *Citrus Ind.*, *32*, 9-13, Feb., 1951.

Six packs of citrus concentrates were stored at five temperatures between —8° F. and 40° F. Results after six months indicated that gelation and clarification was more pronounced in concentrates from seedy varieties of fruit. Clarification and varying degrees of gelation occurred in all samples stored at 20° F. and above. The rate of reduction in microbiological counts was greatest in the samples stored at the higher temperatures.

Food freezing. Survival of certain microorganisms in selected frozen foods.

WEISER, H. H. *Quick Frozen Foods, 13*, 50-52 (1951).

Several genera will grow at temperatures below 0° C. *Clostridium botulinum*, typhoid and cholera bacilli survive for considerable periods of time. Air tight containers result in more destruction at the same time and temperature than open ones.

Consumer reactions to Alayam candy.

LANHAM, JR., B. T. *Alabama Agric. Expt. Sta. Bull., 271*, 1-62 (1950); *Biol. Abst., 24*, 3034, No. 32219 (1950).

Alayam candy, developed by the Alabama Station, was made by combining equal proportions, on a dry-weight basis, of sweetpotatoes, coconut, and sugar. The finished product was essentially a coconut brittle; its final flavor was a rich blend of coconut and caramel. The product is hygroscopic. In conducting a nation-wide consumer acceptance test of the product, the consumer panel approach was used in selecting consultants. The sample selected was representative of major geographic areas of the U. S., and of the U. S. as a whole. Testing took place simultaneously over the country during the period May 1-10, 1949. In comparison with all candies currently on the market, 42% of all respondents liked Alayam candy as well as, or better than, the candies they normally prefer. Alayam candy stood up better in comparison with brittles and hard candies than with other candies. More than half of the respondents indicated the sweetness of the product was satisfactory. A similar proportion liked its texture or quality, and its flavor or taste. More than a third indicated they would buy the product if it were placed on the market. Less than 1% detected sweetpotato as the dominant flavor and/or as an ingredient of the product. Reactions, generally, were more favorable in the Census South than in other parts of the country. The product is not now produced commercially; all manufacturing to date has been done on a pilot-plant basis at the Alabama Station in Auburn.

Changes in the sugar composition of coconut water during maturation and germination.

CHILD, R., AND NATHANAEL, W. R. N. *J. Sci. Food Agric.*, *1*, 326-9 (1950).

From the most immature fruit in which the cavity has just formed to about the seven-month-old fruit when it is full size but still unripe, the sugars present, which are almost entirely reducing sugars, increase to a maximum of about 5% concentration. Thereafter non-reducing sugars appear, but the total concentration of sugars falls to about 2% in the fully ripe nut, 12 to 13 months old. During the early stages of germination, the concentration of reducing sugars continues to fall, but that of total sugars remains fairly constant until the fourth month of germination, when it also falls.

The component fatty acids and glycerides of groundnut oils.

CRAWFORD, R. V., AND HILDITCH, T. P. *J. Sci. Food Agric.*, *1*, 372-9 (1950).

The component acids of four groundnut peanut oils of differing iodine value (86 to 99) have been determined. The linoleic acid content of the mixed fatty acids varied from 20% to 38%, the oleic acid content correspondingly ranging from 60% to 39%. The variable linoleic acid content has a marked influence on the component glycerides of the oils. The probable bearing of these factors on liability to oxidative rancidity is considered.

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Attention to the composition of seed oils intended for specific technical uses, as a primary consideration in the selection of oilseeds for cultivation, is indicated.

On the phosphorus of potato starch.

POSTERNAK, T. *J. Biol. Chem., 188,* 317-25 (1951).

The structure of the phosphohexaose and of the phosphotetraose obtained by α-amylase degradation of potato starch has been investigated. Potato starch contains about 1 atom of P per 300 glucose units.

Effects of storage on potato quality.

HARRIS, R. H. *Bi-m. Bull. N. Dakota Agric. Exp. Stat., 12,* 99 (1950); *Nutrition Abstracts and Revs., 20,* 281, No. 1498 (1950).

Potatoes were stored at 32°, 36° or 40° F. for 2, 4, or 8 weeks, conditioned for processing at 60° F. for 2, 4 or 6 weeks, then dehydrated. On reconstitution they were cooked and judged for flavor, texture, and color. It was concluded that a minimum storage temperature of 40° F. was best, and that conditioning did little to improve the quality if this had been impaired by excessive accumulation of sugars caused by prolonged storage at low temperatures.

Laboratory assessment of pectin quality with special reference to jelly grading.

OLLIVER, M. *J. Sci. Food Agric., 1,* 329-36 (1950).

Apparatus for testing jelly strength is reviewed, attention being drawn to the different physical principles involved. The American definition of pectin jelly grade has been adapted to conform with English jam-manufacturing practice, and the effect of different conditions of gel preparation is described. Rate of cooling and pH are more important factors than type or quantity of buffer, and temperature of aging and soluble-solids content both exert considerable influence above pH 3.0. Points are listed for consideration when formulating a laboratory procedure for jelly grading. Methods of determining the rate of set are briefly described.

Dielectric vs. stewpan cookery.

STEVENS, H. B., AND FENTON, F. *J. Am. Dietet. Assoc., 27,* 32-5 (1951).

There were no statistically significant differences in the retentions of ascorbic acid, thiamine, riboflavin, or weight in frozen peas cooked in the dielectric range in their own frost and in the stewpan in 30 gm. water. Peas cooked by the two methods were about equally acceptable in palatability. Slight under and over cooking in the dielectric range did not affect the retention of ascorbic acid significantly, but it did affect the palatability. The cooking time required in the dielectric range was about one-third of that in the stewpan method.

PATENTS (U. S. A.)

Method of treating food products.

PAGE, P. 2,539,157, Jan. 23, 1951.

The method of treating coffee beans comprising subjecting beans within an enclosed system to an evacuating operation to initially reduce the pressure within system to about .001 to .005 mm. of mercury, heating beans to expel the moisture therefrom, collecting moisture, distilling beans to remove vaporizable constituents, distilling temperature being about 350° to 500° F.

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Salt product.

DIAMOND, H. W., AND MILLER, F. G. Assignors to General Foods Corp. 2,539,012, Jan. 23, 1951.

A free-flowing, non-caking salt composition consisting essentially of a normally hygroscopic salt having a water-repellent metal soap adhering to the particles thereof, and a surface-active agent of the group consisting of sulphonated amides, substituted ammonium compounds, cyclic quaternary ammonium compounds, polyethylene glycol fatty acid esters, alkyl aryl polyether alcohols and polyalkylene derivatives of hexitol anhydride fatty acid esters, the proportions of soap and surface-active agent being about 0.05-2.0% and 0.025-0.75%, respectively, of the weight of the salt.

Method and installation for homogenization of liquids.

FRØDING, O. E. Assignor to Aktiebolaget Separator. 2,539,125, Jan. 23, 1951.

A method of homogenizing milk and other products having particles in dispersion, which comprises the steps of feeding at least part of the dispersion product, containing relatively large dispersed particles, through an homogenizing zone to homogenize the product and effect a reduction in the particle sizes, passing the homogenized product from zone, into a locus of centrifugal force and there separating it into two components, one of which contains relatively small particles, and the other of which contains larger particles, and re-returning last component to the homogenizing zone for further homogenization treatment therein to reduce the sizes of larger particles.

Uniformly substituted esters of glucopyranose polymers.

GAVER, K. M., LASURE, E. P., AND THOMAS, L. M. Assignors to The Keever Starch Co. 2,538,903, Jan. 23, 1951.

Uniformly substituted 2-carboxylic acid esters of glucopyranose polymers wherein the acid radical contains nitrogen. The process of forming a starch ester which consists of the step of heating a lower alkyl amide having not more than four carbon atoms with starch at a temperature at least 80° C. and not more than 115° C. during the reaction period in a non-aqueous system wherein there is provided a non-aqueous solvent having a boiling point at atmospheric pressure higher than 80° C.

Method for producing protein hydrolysis product.

CLELAND, J. E., AND HENKE, E. Assignors to Union Starch & Refining Co. 2,538,898, Jan. 23, 1951.

In a process for manufacturing a light colored, plastic protein hydrolysis product from vegetable proteins which contain no starch and no starch conversion products as impurities, the steps comprising, adding lime and water to the protein to give a composition having a pH of 9-13.5, hydrolyzing the resultant composition under steam pressure of 25-45 lbs. for from ⅛-2½ hours, filtering the resultant composition, precipitating the alkaline earth metal ions introduced by lime by bubbling SO_2 gas through the mix, filtering the product to eliminate undissolved protein and the precipitated compounds, and concentrating the resultant dissolved protein hydrolysate.

Reel-type oven for baking.

HOWARD, S. T. 2,539,423, Jan. 30, 1951.

An oven comprising an oven body, a door opening in one of the walls of oven body, a conveyor mounted for rotation within oven body, a plurality of shelves for supporting baking pans, mounted on conveyor, a heat screen for covering baking pans, pivotally mounted at the rear of each of shelves, and means for holding each of heat screens in raised position.

SHARK LIVER OIL

Experiments recently conducted by the Department of Chemical Technology, Bombay University on deodorization of shark liver oil have yielded satisfactory results.

Higher vitamin "A" potency of shark liver oil, compared with cod liver oil is offset by its more offensive smell and the object of experiments was to evolve a process for removing the fishy odour.—[From *Eng. Chem. Digest*, 2, (11) 405, 195D.]

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POSTWAR RECOVERY OF WORLD SUGAR PRODUCTION

One of the outstanding developments in the world food picture is the rapid recovery of sugar production. In 1949/50 world production (exclusive of the U.S.S.R.) reached 30.4 million metric tons (raw value), as compared with the prewar average of 26.1 million metric tons (29.6 million metric tons in 1948/49). Preliminary indications are, as of the first part of October, that the total in 1950/51 will reach 33.2 million metric tons, an increase of 6.3 million metric tons over the prewar average.

The U.S.S.R. is excluded from all these totals as no official or reliable data on its production, trade, or consumption are available. Informed estimates place its 1949/50 production at 2,100,000 metric tons, as compared with an estimated prewar production of 2,300,000 metric tons. In addition, it is estimated that in 1949/50 the U.S.S.R. imported 400,000 to 500,000 tons of sugar (net), largely from Eastern European countries.

Three important changes from the prewar picture deserve notice. First, in 1949/50 world per caput production exceeded the prewar level for the first time since the end of the war, averaging 13.6 kilograms per person as compared with the prewar average of 13.4 kilograms. In 1950/51 it will be substantially higher, on an overall world basis, than in 1949/50. This increase is more significant than might appear at first sight. Postwar political and economic dislocations have made it impossible for many millions of human beings to benefit from the increase in world production, with the result that the greater output has to find a market among a much smaller segment of the world population.

Second, recovery was unevenly distributed geographically in 1949/50 and will remain so in 1950/51. The share of the Western Hemisphere in total world production has been much larger than in prewar years (46.3 percent as compared with 35.2 percent in 1934-38). On the other hand, the share of Asia is still much below prewar. Economic, social, and political turmoil in that part of the world following the disintegration of the old colonial structure has prevented the reestablishment of the prewar sugar industries, especially in the major exporting countries. In 1950/51, although production is likely to be significantly higher than in the past year, it will still be far below prewar.

The distribution of the world sugar production by continents is shown in the table below:

Continent	1934-38	1949/50	1950/51 (preliminary)
	Thousand metric tons, raw value		
Africa	1,174	1,514	1,562
Asia	7,445	6,057	6,519
Europe (excluding U.S.S.R.)	6,536	6,770	8,110
North and Central America	6,978	10,870	11,657
South America	2,208	3,187	3,329
Oceania	1,777	1,974	2,010
World total, excl. U.S.S.R.	26,118	30,372	33,187
U.S.S.R.	2,300*	2,100*	2,150
WORLD TOTAL	28,418	32,472	35,337

*Estimated.

(From FAO Commodity Reports: Sugar. November 22, 1950)

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BANANAS AND PINEAPPLES QUICK FROZEN IN QUEENSLAND, AUSTRALIA

Realizing the possibilities of an export market in quick frozen pineapples and bananas, the Queensland Department of Agriculture are now making experiments to discover the best ways of processing these fruits.

Pineapples of either rough or smooth leaf varieties may be used successfully. The former gives a more attractive pack, the latter a higher yield. Quality of the raw material is, as for all frozen foods, of outstanding importance and the temperature of freezing must be low. Holding tests now in progress will show how well pineapple frozen in various ways stand up to long storage such as overseas shipment involves.

Having a strong tendency to brown after cutting, bananas are more difficult to freeze. This is due to the well developed oxidase system in this fruit. It appears that the addition of some anti-oxidant is essential to obtain a satisfactory color.—*Food Technol.* in Australia, 2, 202 (1950).

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REVIEW ON DEHYDRATED MASHED POTATOES PUBLISHED

A difficulty encountered in the production of dehydrated mashed potatoes has been excessive cell rupture. When tissue cells are damaged, solubilized starch is released; if the amount is large the reconstituted product is pasty instead of fluffy and appetizing. To avoid this condition, several basic techniques have been developed that allow handling without appreciable damage to the structure of cells.

A very general technique for producing dehydrated mashed potatoes is utilization of effect of partial dehydration of cooked potato tissue. At a moisture content of approximately 50%, starch gel strength and cell-wall toughness reach a maximum. Under these conditions cooked potato dice or mash can be reduced to a moist, friable powder without undue cell wall rupture and without stickiness. To reach this state, cooked potatoes are (a) predried on trays or roller driers, (b) mixed with an appropriate amount of previously dried powder, or (c) dewatered by direct or centrifugal pressure after cooking, freezing, and thawing.

With other methods it has been found possible to condition the cooked potatoes so that stickiness decreases and the mash can be divided into small particles or individual cells without excessive cell rupture. A holding period is used, the duration of which is dependent upon the temperature, the raw material used, its moisture content, and possibly other factors. Conditioning at temperatures below freezing, if properly controlled, produces a product of superior texture and rapid dehydration character. Calcium salts are recommended in some instances to toughen cell walls so that they are not ruptured easily.

A detailed review concerned with the general characteristics and methods of production of dehydrated mashed potatoes and their advantages over other forms of dehydrated potato (dice, julienne strips, and riced was recently assembled by R. L. Olsen and W. O. Harrington of the Western Regional Research Laboratory, U. S. D. A., of Albany, California. The mimeographed report (AIC-297) which covers the literature and patents up to September 1950, is available free upon request.

EMPLOYMENT NOTICES

WANTED: Chemical Engineer. Large national firm in cereal field needs graduate chemical engineer with experience in food processing. Location in Minneapolis. Please state education and experience fully. REPLY BOX 138, Institute of Food Technologists, 176 W. Adams St., Chicago 3, Ill.

POSITION WANTED: Food Technologist, female, 23 yrs. old, desires position in Quality Control Lab. Experience in Food and Drug Lab. Experience (not technical) in meat and baking industry. REPLY BOX 150, Institute of Food Technologists, 176 W. Adams St., Chicago 3, Ill.

WANTED: Positions open for two or three Food Technologists with some background in baking or allied fields, with a sound progressive company. Salary open. Company will pay cost of relocating. REPLY BOX 151, Institute of Food Technologists, 176 W. Adams St., Chicago 3, Ill.

WANTED: Research Director, medium size meat packing company, Indiana location. Successful experience in meat packing or food research and development essential. Must have ability to assume complete charge of department. Salary open. REPLY BOX 152, Institute of Food Technologists, 176 W. Adams St., Chicago 3, Ill.

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PRINCIPLES OF DRYING AS PERTAINING TO VEGETABLE DEHYDRATION DISCUSSED IN U. S. D. A. PUBLICATION

The Western Regional Research Laboratory of Albany, California has undertaken a complete revision of U. S. Department of Agriculture Miscellaneous Publication No. 540, the Dehydration Manual, which was issued in June, 1944, and has been out of print for several years. The revised edition will contain much information which was not available in 1944.

The bulletin, AIC-300, "Principles of Drying" is a preprint or tentative draft of a chapter and many of the other revised chapters will be preprinted in this same way. It is the hope of the author, W. B. Van Arsdel, that readers will feel free to criticize this tentative draft and make suggestions for its improvement, so that the final publication may be truly authoritative.

The publication is addressed to a special audience, namely the actual or prospective operators and technicians of vegetable dehydration plants. It is written in anticipation of the construction of new plants and the reactivation of others which have been idle for some years. The superintendents and technical or semi-technical employees will be able and energetic men, but unfamiliar with this technology and generally not educated as scientists. Many of them will be located far from any good library. The aim is to give more than a recipe book of instructions, but to explain the reasons why things work the way they do, and thus provide a firm foundation of physical principles. Thus the manual is addressed neither to the general public nor to research men.

FUTURE DATES FOR FOOD TECHNOLOGISTS

1951

August	World Poultry Science Association. Ninth Congress. Paris.
Aug. 2-Sept. 11	Eighth International Congress of Refrigeration. London.
Aug. 6-10	Food and Nutrition Sessions, Gordon Research Conference, AAAS. Colby Junior College, New London, N. H.
Sept. 8-13	XIIth International Congress of Pure and Applied Chemistry. New York, N. Y.
Sept. 26-29	International Association of Milk and Food Sanitarians. Glenwood Springs, Colo.
October	International Association of Ice Cream Manufacturers. Detroit, Mich.
October	International Canning Conference. Paris.
Oct. 8-10	American Oil Chemists' Society, Fall Meeting, Chicago, Ill.
Oct. 1-3	Association of Official Agricultural Chemists. Shoreham Hotel, Washington, D. C.
Oct. 22-24	Packaging Institute, 13th Annual Forum, Hotel Commodore, New York, N. Y.
Oct. 24-26	National Pickle Packers Association, Annual Meeting, Sheraton Hotel, Chicago, Ill.
Nov. 5-8	Refrigeration and Air Conditioning Exposition, Navy Pier, Chicago, Ill.
Nov. 12-15	American Bottlers of Carbonated Beverages. Annual Meeting. Armory, Washington, D. C.

(Information concerning future dates of national and international meetings, conventions and exhibits of interest to food technologists should be sent to the editorial office.)

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Regional Section News

AUSTRALIAN SECTION

There was a very good attendance at the May 3rd meeting of the Section, held in Sydney.

A letter was received from J. R. Vickery, our Chairman, informing us that he will be leaving Australia at the end of June for a five months trip abroad. He sought to resign the Chairmanship or seek leave of absence for the period. It was decided that leave of absence should be granted, and a motion was passed wishing Dr. Vickery a happy, safe and successful trip. J. F. Kefford was appointed deputy Vice-Chairman to take charge of the meetings during the Chairman's absence.

The main business of the meeting was two addresses on the subject of Alginates. Mr. E. J. Ferguson Wood of the C. S. I. R. O. Division of Fisheries spoke on the occurrence, production and extraction of alginates, with particular reference to the Australian resources, and Mr. B. R. Russel of Imperial Chemical Industries Ltd. spoke on the chemical and physical properties of the alginates and their application in the food industry.

The Third Australian Canning Convention is being held in Melbourne on 4th, 5th and 6th September, 1951, and an invitation has been received for members of the Institute to attend. A national meeting of the Institute of Food Technologists will be held at the same time.

The following new applications for membership have been received: (Miss) N. J. Findley, Emily McPherson College, Russel Street, Melbourne; B. J. Somerville, Batlow Packing House Coop. Ltd., Batlow, N. S. W.; J. L. Forsyth, Provincial Traders Pty. Ltd., Little Roma Street, Brisbane; F. K. Carter, Technical Products Pty. Ltd., Brisbane; W. E. Sharpe, 937 High Street, Armadale S. E. 3, Victoria; R. P. Hope, A. Wander Ltd., Devonport, Tasmania; E. G. Davies, Divn. Food Preservation, C. S. I. R.O., Homebush, N. S. W.

DIXIE SECTION

At the May 18th meeting the following officers were elected and assumed office at that time:

Chairman: R. D. Haynes, Tennessee Valley Authority, Knoxville, Tennessee.
Vice Chairman: T. W. Kethley, Georgia Institute of Technology, Atlanta, Georgia.
Secretary-Treasurer: R. E. O'Neill, U. S. Food and Drug, Atlanta, Georgia.
Councilor: J. O. Mundt, University of Tennessee, Knoxville, Tennessee.

FLORIDA SECTION

The Section participated in a joint conference of the Citrus Products Research Council and Florida Canners Association on May 9, in the Florida Room, Florida Citrus Building, Winter Haven, Fla. This conference on the "Processing of Citrus Fruits" was held by the Bureau of Agricultural and Industrial Chemistry, U. S. Department of Agriculture.

Representatives from all the Bureau's Laboratories conducting investigations on citrus products were on hand to discuss phases of the work being conducted. Representatives from the Florida Citrus Industry and the Citrus Experiment Station also participated in the discussions.

The following program lists the papers that were given at the conference:

"Flavor Fortification of Orange Concentrate" by E. A. Beavens, Fruit and Vegetable Chemistry Laboratory, Pasadena, Calif.
"Gelation and Clarification in Citrus Concentrates" by F. W. Wenzel, Citrus Experiment Station, Lake Alfred, Fla.
"Recovery of Essence from Fruits" by P. K. Eskew, Eastern Regional Research Laboratory, Philadelphia, Pa.
"Processing Heat-sensitive Liquids by Steam Injection" by A. H. Brown, Western Regional Research Laboratory, Albany, Calif.
"Storage of Frozen Citrus Concentrate" by C. W. DuBois, Minute Maid Corporation, Plymouth, Fla.
"Pasteurization Studies" by M. K. Veldhuis, U. S. Citrus Products Station, Winter Haven, Fla.
"Some Effects of the Freezes of the Past Season in the Rio Grande Valley" by W. C. Scott, U. S. Fruit and Vegetable Products Laboratory, Weslaco, Texas.
"Army Needs in the Citrus Fruit Field" by Lt. Col. H. C. Keeney, Food Service Division, Quartermaster Corps, Washington, D. C.

Luncheon was served at the Park Cafe, Winter Haven, Fla.

GREAT LAKES SECTION

This Section has announced that the dates for its 1951-52 meetings are as follows:

October 19, 1951, at the St. Clair Inn as guests of W. J. Mahan, Technical Director of the Diamond Crystal Salt Company, St. Clair, Michigan.
January 25, 1952, Battle Creek, Michigan.
April 25, 1952, Grand Rapids, Michigan.

NORTHEAST SECTION

This Section met for its last meeting of the 1950-51 year at the new Home Economics Building, Skinner Hall, University of Massachusetts, Amherst, Mass., at which the following papers were heard:

"The Massachusetts Agricultural and Experiment Station—What it is and What it Does" by Dale H. Seiling, Dean of the College of Agriculture and Horticulture and Director of the Experiment Station, University of Massachusetts.
"What's New in Food Canning Research" by Fred C. Baselt, Manager of Research, American Can Company, New York, N. Y.

Following the afternoon's addresses, a picnic luncheon was served at the Draper Hall Annex.

OHIO VALLEY SECTION

The Ohio Valley Section meeting was held on May 12, at the Hotel Sinton in Cincinnati. The following papers were presented:

"Canned Cake Adapted to Line Production" by D. J. Scheidler and H. Keilholz, Kroger Co.
"Extraneous Matter in Foods" by R. O. Hockman, Kroger Co.
"Principles of Good Deep Frying Practice" by J. R. Andre, Proctor & Gamble.

(Continued on page 6)

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Regional Section News

(Continued from page 4)

"Applying Good Practices to Commercial Deep Frying Operations" by R. A. Wait, Proctor & Gamble.
"Supplies—Where Do We Go From Here?" by N. Voll and R. E. Graves, Kroger Co.

A banquet was held at the hotel. The after-dinner speaker was R. W. Godley, Kroger Company who spoke on "Public Relations and the Food Technologist." The Ohio Valley Section extended an invitation to the IFT to hold the 1955 meeting in Columbus, Ohio.

PHILADELPHIA SECTION

This Section held an evening meeting on May 24, at the Drexel Institute of Technology. On this occasion, this Section was host to the Association of Food and Drug Officials of the United States and the Central Atlantic States Association of Food and Drug Officials. Refreshments were served in the Student Building from 7:15 to 8:15, after which the combined group was entertained by Dr. E. S. Guenther of Fritzsche Brothers who presented coloured motion pictures on "Production of Essential Oils in the Western Hemisphere."

During the afternoon of the same day there was a "Drexel Nutrition Program" which dealt with the world food supply and which was attended by many IFT members.

The following officers have been nominated for the 1951-52 season:

Chairman: Dr. Walter L. Obold, Drexel Institute of Technology.
Vice-Chairman: Robert C. Bucher, Frank H. Fleer Co.
Secretary: Dr. John L. Barnhart, Temple University
Treasurer: Warren R. Godfrey, Fritzsche Brothers, Inc.
Councilor: R. A. Pouchain, Tasty Baking Co.
Executive Committee: Harry E. Dessender, Virginia Dare Co.; Edwin C. Dryden.

PUGET SOUND SECTION

The April 26 meeting of the Puget Sound Section of the Institute of Food Technologists was unique in that it afforded the membership an interesting and instructive tour through the Sumner, Washington, Yeast and Vinegar Plant of Standard Brands, Inc., followed by a dinner held a few miles to the south at Puyallup, Washington.

George Adams, Superintendent of the Sumner Yeast and Vinegar Plant was our genial host, and the Section, in turn, was his dinner host.

Following the dinner, R. L. Albrook, Director of the Division of Industrial Research at Washington State College, Pullman, addressed the group on "Possibilities of Cannery Waste Utilization." The considerable interest manifested in his talk was evidenced by the questions and discussion which followed.

PERSONNEL

E. A. Beavens, John L. Etchells and Robert H. Ingram were among the 91 U. S. Department of Agriculture employees who received the Superior Service Award of the Department.

Newton R. Cole, Development Engineer, Walter Baker and Company, Dorchester, Mass., has been elected General Chairman of the 1953 National IFT Convention to be held in Boston, Mass.

Charles J. Hill, until recently with the Comstock Canning Corp. of Newark and Geneva, N. Y. has accepted a position with the Seabrook Farms Co. of Bridgeton, N. J.

Luke Roehm, a Past President of the Great Lakes Section, IFT, has resigned as Assistant General Sales Manager of the Dow Chemical Company. On April 1st, he assumed the position as Manager of the Corn Division of the A. E. Staley Manufacturing Company, Decatur, Ill.

Roy H. Walters has been promoted to the position of Director of Research and Development for the General Foods Corp. of New York, N. Y.

James J. Winston has been appointed to the position of Director of Research of the National Macaroni Manufacturers Association of New York, N. Y.

IFT MEMBERS TO PARTICIPATE IN THE SECOND INTERNATIONAL CANNERS CONFERENCE IN PARIS NEXT OCTOBER

Several members of the IFT expect to attend the Second International Canners Conference in Paris in October. C. Olin Ball, of Rutgers University and Editor Emeritus of Food Technology, will deliver a paper entitled "Advancement in Food Processing Methods in the Canning Industry in 1940-1950." Roger H. Lueck and K. W. Brighton of the American Can Company Research Department will deliver a paper entitled "Technical Innovations in the Canning Industry in the U. S. A. During the Last Decade." Charles G. King, Scientific Director of the Nutrition Foundation is included on the tentative program. His contemplated talk is "Newer Nutrients and Their Relation to Food Processing."

In addition, two IFT members now stationed at the FAO Headquarters in Rome, will attend the meeting. Mogen Jul will talk on technical developments in the canning of fish, and A. G. Van Veen will talk on the importance of canned food in world nutrition.

ADDITIONAL RESEARCH NEEDED ON PESTICIDE RESIDUES

According to a circular letter issued on May 15, 1951, the Food Protection Committee of the Food and Nutrition Board of the National Research Council recently approved a statement for release regarding the need for additional research work on pesticide residues.

The Commitee unanimously agreed that additional data are sorely needed on the residues of pesticides remaining on food products and forage following their application by different methods under different environmental conditions. A resolution was passed, therefore, urging that investigators acquire such data as rapidly as possible. The suggestion is made that chemists be encouraged to secure much additional analytical data on pesticide residues.

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Authors of papers intended for publication in FOOD TECHNOLOGY should request from the editorial office a copy of the booklet, entitled "Suggestions to Authors." Manuscripts submitted for publication in FOOD TECHNOLOGY should follow the style described in this booklet.

The Institute of Food Technologists assumes no responsibility for statements in contributed articles appearing in FOOD TECHNOLOGY. Editorials present only opinions of the writers and do not necessarily reflect policies of the Institute of Food Technologists.

STATUS OF THE PORTUGAL SARDINE INDUSTRY

After a two-year period of absence, the sardines off the Portuguese coast made their reappearance at the end of July 1950. This promised to end the severe economic hardships caused to the fishing and canning industry by the shortage of sardines, a December 22 American consular dispatch from Lisbon states.

Owing to the small catch of sardines, Portugal had discontinued importation of tin plate in May 1949. Since there is no domestic production, shortly after the reappearance of the sardines an effort was made to acquire tin plate. The agreement to supply the United Kingdom with half a million cases of sardines (which has been completed) had no provision for supply of tin plate. Orders from France for tin plate were not filled, and United States mills were not able to supply any even at sharply increased prices.

The Economic Cooperation Administration authorized and made available to Portugal $433,000 and later $1,367,000 for the purchase of tin plate in the United States of 2,500 and 6,500 tons, respectively (a total of 9,000 tons for $1,800,000) at $200 a ton. However, to date no purchases of tin plate have been reported.

Since the latter part of November 1950, the sardines seem to have again disappeared off the Portuguese coast, with the result that the catch towards the end of 1950 was sporadic and canning and exports were greatly reduced.

Studies for the expansion of Portuguese sardine exports to the United States have been continued and the following suggestions have been considered by the Portuguese Office of Fishery Studies:

1. Grouping of numerous separate shipments to the United States to expedite inspection.

2. Publicity for the marketing of other than skinless and boneless sardines in olive oil; and more attractive labels.

3. Attempting to compete with Norwegian spratt and brisling packed with a large number of fish to the can in inferior oils but in attractive Norwegian-made aluminum cans, and which sell at lower prices than the Portuguese canned sardines. (Portuguese experiments with aluminum containers for sardines have not been successful in the past, according to a Portuguese official, but in light of the Norwegian success they might be resumed).

4. In shipping to the United States in containers of American tin plate, a waiver of part of the American duty on the containers might be obtained as well as an exemption on the Portuguese export tax. (At the moment, however, the Portuguese importer is so concerned with obtaining tin plate that he has not attempted to take advantage of any such possibilities).

Inasmuch as Portugal did not devaluate as much as Great Britain, the former is at a disadvantage in selling its sardines in the sterling areas. Although Great Britain is looking toward Morocco, Yugoslavia, and Japan where more favorable exchange rates can be found, there is no indication that Great Britain will reduce imports of Portuguese sardines.—[From *Comm. Fisheries Review*, 13 (2) 65 (1951).]

CENTRAL FOOD TECHNOLOGICAL INSTITUTE OPENED IN INDIA

On October 21st, 1950 the new Central Food Technological Institute was opened at Chelumba, Mysore. According to a report in *Nature* [**167**, 268 (1951)], the Institute is housed in a mansion which was a former residence of the late Princess Cheluvajemmenni Evaru, an aunt of the Maharajah. The solid and imposing palatial structure stands in a park of one hundred fifty acres. Other well known scientific institutions in the same area are the Indian Institute of Science and the Sir C. V. Raman's Institute, both at Bangalore. The Nutrition Institute at Coonoor is not far away.

India has a serious problem on hand in the form of its food deficit, but it should be possible to tackle the deficit of 10% by preventing losses during storage caused by fungus, monkeys, rats and insects.

The Institute is to do pioneering work in food engineering in India. Its divisions of biochemistry and processing have been concentrating on the production of suitable fortified grains prepared from different starch-bearing materials, pulses and seed cakes. It will also develop new processed and synthetic foods for use in Indian dietaries. Work on the processing and preservation of various Indian fruits is in progress, and special emphasis is put on the combination foods of higher nutritional value and developed from Indian raw materials. The Institute will investigate problems connected with the storage, refrigeration, dehydration, canning of plant foods, investigate the palatability and digestibility of coarse foods and do process development up to the pilot plant stage.

Dr. V. Subrahmanyan is director of the Institute.

REFRIGERATED LOCKER STORAGE OF FISH AND SHELLFISH

Too frequently the locker operator and user fail to realize that fish as well as other foods have a maximum storage life even in the frozen state. The dry atmosphere of the storage room and the difficulty encountered in sealing the product away from air contribute most to shortening storage life.

Several changes take place in locker storage which must be guarded against by adequate packaging to exclude air. One change, common to all frozen fish, is a gradual removal of moisture from the flesh over a prolonged storage period in the relatively dry atmosphere of the cold-storage room. This drying renders the fish tough, fibrous, and insipid. The other change which occurs with certain oily fish is an oxidation resulting in development of rancidity, fading or other changes in the pigments of fish having colored flesh (as salmon), and development of off-colors (usually yellow or brown) sometimes known as "rust." These changes eventually render the fish flesh inedible. A guide by Stansby and Harrison (1942) and Stansby and Dassow (1942) for selecting a packing method and estimating the storage life of frozen salt-water fishes asserts that, in general, a locker storage life of at least six months may be expected for the most properly packaged frozen fish. [Fishery Leaflet 128, from *Com. Fisheries Review*, 13 (4) 25 (1951)].

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	Protease 16	Experimental	
Amylolytic	RHOZYME S	Commercial	Hydrolysis of starch to dextrins, maltose and glucose. Contain both an alpha amylase and a strong glucogenic principle. pH range 5-6. RHOZYME S is a purified enzyme; RHOZYME T-22 the crude product.
	RHOZYME T-22	Commercial	
	RHOZYME DX	Commercial	Hydrolysis of starch to dextrins. Heat stable. pH range 5.5-6.5.
Lactase	Lactase B	Experimental	Hydrolysis of lactose to glucose and galactose. pH range 6.1-7.5.

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Book Review

CHEMISTRY AND BIOLOGY OF PROTEINS. By Felix Haurowitz. pp. 374. Academic Press, Inc., New York, N. Y., 1950. Price $5.50.

This book is quite in keeping with the author's expressed purpose of writing a book primarily for the use of graduate students interested in the fundamental aspects of protein chemistry. The material is condensed, but the book contains a surprising amount of information on the chemistry and biology of proteins. A good selection of subject matter from the protein literature has been made, and the material is well integrated to give the students a well-rounded understanding of the chemical and biological nature of proteins. The technicological aspects of proteins are not dealt with, this aspect being considered to be beyond the scope of the book. For use as a text, the book ranks high as a brief but reasonably complete presentation of the essentials of protein chemistry.

The subject material is divided into seventeen chapters under the following headings: I. Role of Proteins in Biology; II. Isolation, Purification, and Determination of Proteins; III. Hydrolytic Cleavage of Proteins; IV. Size and Shape of Protein Molecules; V. Electrochemistry of Proteins; VI. Interaction of Proteins with Water; VII. Internal Structure of Globular Proteins; VIII. Albumins, Globulins, and Other Soluble Proteins; IX. Insoluble Proteins (Scleroproteins); X. Combination of Proteins with Other Substances; XI. Conjugated Proteins; XII. Proteins with Enzymatic Properties; XIII. Proteins with Hormone Activity; XIV. Role of Proteins in Immunological Reactions; XV. Toxins (Toxic Proteins); XVI. The Supply of Amino Acids for Protein Biosynthesis; XVII. Protein Synthesis.

The author departs from the more or less conventional order of presentation, namely that of dealing first with the amino acids in laying a foundation for an appreciation of protein composition and complexity. Following the first chapter (two pages), the problem of purification, isolation and determination of proteins is presented. One might question the advisability of presenting such methodology before the students are acquainted with protein composition and behavior as presented in Chapters III through VII. The style of presentation and treatment of the subject matter in each of these chapters is clear and concise. Only that amount of mathematical treatment necessary for understanding of the principles involved is given.

In Chapter VIII, Albumins, Globulins, and Other Soluble Proteins, the author briefly refers to the classical classification of soluble proteins and concludes, "It is preferable therefore, to renounce a more or less unsatisfactory classification and to discuss the more important types of proteins according to their biological occurrence." In the subsequent discussion, however, the various proteins are termed albumins, globulins, etc., indicating that the classification is useful and necessary. The reviewer questions the desirability of discontinuing the present classification even while recognizing that it lacks precision.

The subjects of immunological behavior of proteins and of assimilation and general metabolism of amino acids are well presented. The last chapter of the book deals with the subject of protein synthesis with major emphasis on the site of and the possible role of nucleic acids and chromatin material in protein synthesis. Some mild criticism might be made of the comparatively large amount of space devoted to the "template" hypothesis of protein formation.

An outstanding feature of this book, as compared to most textbooks of comparative length, is the rather extensive list of references given for the source material. This feature is a desirable one in enabling the student to become acquainted with the pertinent papers in each specialized field.

HARRY L. FEVOLD.

MILK AND MILK PRODUCTS. By Clarence Henry Eckles, Willes Barnes Combs, and Harold Macy. pp. 454. McGraw-Hill Book Company, New York, N. Y., 4th Edition, 1951. Price $5.00.

Milk and Milk Products was first published in 1929 and is now in its 4th edition. The style of this book has not been altered but it has been increased in size and errors have been eliminated. The printing and illustrations are excellent. The chapters are arranged logically and numerous subheadings are given in the contents. The subjects are thoroughly indexed.

The book was written as a text for the introductory course in dairy industry in colleges of agriculture. The student is expected to have had a course in chemistry and algebra but no studies in bacteriology or the chemistry of foods. Hence, there is a chapter on microörganisms and the chapter on Milk and Dairy Products as Food begins with a dozen pages of elementary food chemistry. The authors have clearly endeavored to present material at the collegiate level in a clear, interesting style.

The subject matter to be given in an introductory dairy course may vary with the teacher. In this book the widely accepted policy has been followed of arranging material in logical dairy sequence beginning with history, and then following with the composition, properties, and food value of milk, the Babcock test, dairy processes, the various dairy products, dairy arithmetic, and dairy tests. The procedures given for tests and manufacturing process must be brief but enough is presented, together with the scientific background, to give the student a good idea of them.

In a general text it is essential to eliminate unimportant material that more essentials may be given. The authors have done very well in this regard but the paragraph on Thunder Storms and the Souring of Milk might well be deleted. There is also a little repetition of some tests. Milk flavors are fundamental to quality in all dairy products so the discussion of this topic appears to be meager even though there are other comments on this subject in various places in the text.

When the original edition was published, the product prepared by removing the water from skim milk was called dry skim milk. This same terminology has been

(Continued on page 12)

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Book Review

(Continued from page 10)

followed in the 4th edition even though this product is now designated as Nonfat Dry Milk Solids. In fact, this new name does not even appear in the index but it is given in the text. The authors must have given careful consideration to the new name.

At the time this book was being revised the only fermented milk drink of much significance in the United States was cultured buttermilk. In view of the recent promotion of yoghurt and its present national prominence, the authors may take some satisfaction from the following sentence that appears in all editions, "One of the most famous fermented-milk preparations is known as 'Yoghurt' or 'Matzoön'."

Milk and Milk Products deserves to continue as a leading text bok for use in the course in elementary dairy industry in agricultural colleges.

A. C. DAHLBERG.

DDT INSECTICIDE IS SAFE IF WISELY USED

DDT, an essentially poisonous material, can be used with a wide margin of safety if it is wisely used, reports the Committee on Pesticides of the Council on Pharmacy and Chemistry of the A.M.A. in the March 10, 1951 issue of the Journal of the American Medical Association.

DDT, in the form of powders, solutions, emulsions and aerosols, has been widely used in recent years to control plant and animal pests as well as disease-carrying insects with a great deal of success.

The committee, which recently reviewed literature and case reports on the substance, points out that the poisonous effect of DDT on living organisms decreases with the increase in complexity of the organism. Thus insects, a lower type of organism, are destroyed by the substance while human beings and the higher types of animals are "not likely" to be harmed.

Some human deaths, however, have been caused by DDT and therefore "certain precautions must be observed to guard against its potential toxic properties" they added.

A warning was given to farmers to be careful when applying DDT to food or fodder crops. DDT applied directly to the edible portions of a plant may result in poisoning. It should not be used on dairy cattle or animals being prepared for slaughter, the committee pointed out, since there is a danger of accumulation of the substance in the milk and tissues of treated animals.

Some other precautions suggested by the committee are as follows:

"Persons exposed to large amounts of DDT dusts and powders under confined conditions or where dust particles are not carried away by free movement of air currents should wear respirators. (Chronic poisoning from DDT may result from prolonged ingestion or exposure to small amounts.) Such conditions might be encountered in mass delousing procedures, larviciding with dusts, and manufacturing or formulating operations. Protective clothing should be worn when there is a possibility of greases and oils contaminating the skin, thereby enhancing the absorption of DDT dusts or powders. . . .

"Frequent or prolonged exposure to emulsions or solutions of DDT in petroleum oils and organic solvents should be avoided unless protective clothing, goggles and neoprene or solvent-resistant gloves are worn. (Oily solutions may be absorbed through the skin.) Clothing must be changed promptly if concentrates are spilled on them. A contaminated skin area which has come in contact with DDT soaked clothing or spilled DDT concentrates should be washed immediately with soap and water. Concentrates should be mixed in well ventilated rooms and fire precaution observed when volatile and inflammable solvents are present. . . .

"Operators involved in large scale spraying or fogging with solutions of 5% or more of DDT should wear respirators and other protective devices. Smoking is to be avoided during spraying when combustible mixtures are used. Greaseless skin lotions should be used on exposed body surfaces when irritant solvents are present in the formulation. Clothes should be changed and the body cleansed after each day's operation."

ANNOTATED BIBLIOGRAPHY OF VITAMIN E FOR 1940-1950 PUBLISHED

Keeping abreast of new developments in vitamin E research is difficult even for the vitaminologist. For the physician, the biologist, and the chemist, the task is practically impossible without help from specialists in the field of vitamin E. Active research, with resultant progress, in this field has increased steadily since the discovery of vitamin E in 1922. During the ten-year period from 1940 to 1950, there were more than 1500 scientific publications and patents concerned with vitamin E.

With these facts in mind, the Research Laboratories of Distillation Products Industries of Rochester, N. Y. have prepared this annotated bibliography for the use of everyone interested in vitamin E. The brief abstracts accompanying most of the references perhaps emphasize physiological more than chemical or medical aspects. They summarize the principle results reported, but they are not intended to be critical and neither the compilers nor the distributors guarantee the correctness of any statement appearing in the abstracts or in the original articles on which the abstracts are based.

Pertinent scientific literature from 1940 to 1950 has been included. Publications prior to 1940 have been available in a similar bibliography prepared by Merck & Co.

The bibliography was prepared by Philip L. Harris and Wilma Kujawski of the Distillation Products Industries staff with the aid of Stanley R. Ames and Mary L. Quaife. It is distributed by the National Vitamin Foundation, Inc., of 150 Broadway, New York 7, N. Y. Its price is $3.00.

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Selected Abstracts

ANALYTICAL METHODS

Food.

MATCHETT, J. R. *Anal. Chem., 23,* 221-7 (1951).

A review covering December 1949-November 1950 of methods of analysis pertaining to food. Topics covered include: moisture, proteins and amino acids, metallic ions, fats, enzymes, carbohydrates, vitamins, color, odor and taste, spoilage and contamination.

Water analysis.

LOVE, S. K. *Anal. Chem., 23,* 253-7 (1951).

Third annual review of analytical procedures applied to water analysis. Topics include: Calcium and magnesium, hardness, copper, iron, zinc, lead, sodium and potassium, pH, alkalinity and carbon dioxide, chloride, fluoride, nitrate, phosphate, chlorine, dissolved oxygen, biochemical oxygen demand.

A simple and rapid determination of saponification numbers.

HAHN, *F. L. Anal. Chim. Acta, 4,* 577-9 (1950) (in German).

KOH dissolved in a mixture of glycol-monoethylether and xylene is an ideal reagent for the determination of saponification numbers.

BIOLOGICAL SCIENCES

BIOCHEMISTRY

Effect of cocoa upon human calcium and nitrogen retention.

Nutrition Revs., 9, 38-40 (1951).

The review indicates that ingestion of moderate amounts of cocoa does not have any deleterious effects on calcium retention. It is indicated that the tolerance for cocoa is about 1 ounce per day.

Metabolism of isomers of linoleic and linolenic acids.

HOLMAN, R. T. *Proc. Soc. Exptl. Biol. Med., 76,* 100-02 (1951).

Classical symptoms of fat deficiency were cured only by ethyl linoleate. Arachidonate cured symptoms and caused renewed growth. Conjugated linoleic acid worsened fat deficiency symptoms. Supplementation with linolate and linolenate gave good weight gains. Feeding conjugated linoleic acid drastically reduced total fatty acids in the rats. Trans-isomers of "essential" fatty acids are converted to inactive forms of polyunsaturated acids spectrophotometrically detectable.

MICROBIOLOGY

Fungicidin, an antibiotic produced by a soil actinomycete.

HAZEN, E. L., AND BROWN, R. *Proc. Soc. Exptl. Biol. Med., 76,* 93-7 (1951).

A fungistatic, fungicidal substance called fungicidin has been isolated from actinomycete No. 48240. The substance apparently lacks antibacterial activity, and gave no hemolysis on blood agar medium. Therapeutically, fungicidin appears to be of value in histoplasmosis and cryptococcosis induced in mice.

NUTRITION

Antibiotics in mature fowl nutrition.

HALICK, J. V., AND COUCH, J. R. *Proc. Soc. Exptl. Biol. Med., 76,* 58-62 (1951).

Hatchability of eggs from birds fed a diet low in vitamin B_{12} decreases to zero in four weeks. Injected vitamin B_{12} improved hatchability of low B_{12} diet animals as did APF and liver "L." Aureomycin and penicillin alone assisted in depletion of B_{12} of the birds. Injection of B_{12} and feeding APF or liver "L" produced egg yolks with about the same amounts of B_{12}.

Influence of APF and aureomycin on the growth of dairy calves.

LOOSLI, J. K., AND WALLACE, H. D. *Proc. Soc. Exptl. Biol. Med., 75,* 531-3 (1950).

Adding APF or crystalline aureomycin to the fluid of the diets of 54 calves for a period of 8 weeks significantly increased the rate of growth and reduced the incidence and severity of diarrhea. Crystalline aureomycin gave a response equal to APF supplement leading to the opinion that the effect is antibiotic.

Effect on APF in supplying multiple factors for the pig.

EDWARDS, H. M. CUNHA, T. J., MEADOWS, G. B., SHAWVER, C. B., AND PEARSON, A. M. *Proc. Soc. Exptl. Biol. Med., 76,* 173-5 (1951).

The data obtained show that B_{12} is beneficial for pigs which were previously depleted on a corn-peanut meal ration. They also show that alkali-treated APF contains a factor or factors which promote growth of pigs and which may have a sparing effect upon B_{12} needs of the pig.

Effect of antibiotics on intestinal microflora and on growth of turkeys and pigs.

SIEBURTH, J. M., GUTIERREZ, J., MCGINNIS, J., STERN, J. R., AND SCHNEIDER, B. H. *Proc. Soc. Exptl. Biol. Med., 76,* 15-18 (1951).

Experimentation with turkey poults and pigs whose diets were supplemented with penicillin or terramycin at a level of 100 p.p.m. showed a reduction in the *Clostridium perfringens* in the ceca of turkeys and feces of pigs. This is viewed as an indication that antibiotics act as growth promoters by preventing enterotoxemia.

Effect of various levels of vitamin B_{12} upon growth response produced by aureomycin in chicks.

STOKSTAD, E. L. R., AND JUKES, T. H. *Proc. Soc. Exptl. Biol. Med., 76,* 73-6 (1951).

A growth promoting effect for aureomycin was noted in the presence and in the absence of vitamin B_{12}. Aureomycin reduced the mortality of B_{12} deficient chicks. In some experiments aureomycin appeared to give a B_{12} sparing action and in others no effect was noted. Sulfamethazine in the diet did not appear to affect the vitamin B_{12} requirement of the chicks.

FOOD PRODUCTS

CEREALS

Waxy rice flour controls curdling in precooked frozen sauces.

Canner, 112, 15, Feb., 1951.

Use of flour made from waxy or glutinous rice appears to be a practical way to solve the problem of curdling in white sauces used in precooked frozen foods.

EGG PRODUCTS

The effect of physical treatments on some properties of egg white.

FORSYTHE, R. H., AND BERGQUIST, D. H. *Poultry Sci., 30,* 302-11 (1951).

Blending results in an initial rapid decrease in ovomucin fiber length (several centimeters at the start) followed by a slow drop to a constant length of about 200 microns. This decrease in fiber length is accompanied by an increase in beating rate and cake volume, reaching a maximum value at a fiber length of about 300 microns. No change in ovomucin content results from the blending treatment. Homogenization, while reducing the ovomucin fiber length only slightly, materially reduces the beating rate, cake volume, and apparent ovomucin content. High speed centrifugation in itself does not seriously harm egg white although a considerable quantity of the ovomucin is removed. Egg white drained from foams may perform satisfactorily, in spite of ovomucin removal, providing the initial foam was not too stable. Prolonged beating of the foam, however, resulted in drained material of poor whipping quality. It may be concluded on the basis of the results obtained in this study that the presence of ovomucin, either in native or modified form is not sufficient to insure satisfactory formation of egg white foams. The results of homogenization confirm previous reports. The importance of even low shear forces, such as might be encountered in pumps

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Abstracts

(Continued from page 14)

and milling devices, is emphasized by the reduction in beating rates in the continuous centrifuge (where the white is never subjected to a high hydrostatic pressure).

FATS AND MILK PRODUCTS

Effects of heat treatment on the stability of lard.

LIPS, H. J. *J. Am. Oil Chemists Soc., 28,* 58-61 (1951).

The storage life of lard was increased by heating it under vacuum to 288-296° C. with 0.1 to 0.5% of various protein and carbohydrate materials (dried whey was the most effective substance used), but undesirable color and odor were produced in the lard by the process, and bleaching and deodorizing to a bland, light colored end-product resulted in a loss of most of the added stability.

Phenolic antioxidants for carotene.

BICKOFF, E. M. *J. Am. Oil Chemists Soc., 28,* 65-8 (1951).

Relative values for the carotene-stabilizing effects in mineral oil solutions of a number of phenolic-type antioxidants were determined. Certain relationships between molecular structure and antioxidant activity were observed. Alkylation of the phenolic compounds in general enhanced activity. Hydroquinone was shown to be an exception in the system studied. Several antioxidants which have been accepted for use in lard have been found to be effective antioxidants for carotene in mineral oil solution. These include nordihydroguaiaretic acid 2-t-butyl-4-methoxyphenol, alpha tocopherol, and esters of gallic acid. In addition, certain bisphenols used as anthelmintics were effective antioxidants for carotene.

Preserving food fats.

SISLEY, J. P. *Oleagineux, 5,* 478 (1950); *J. Am. Oil Chemists Soc., 28,* 36 (1951).

Discusses the biological deterioration of fats by either lipasic hydrolysis or citronic rancidity, which may be counteracted by antibiotics. The chemical or aldehydic rancidity can be counteracted by use of antioxygens such as N. D. G. A., oatmeal, palm oil, tocopherol, lecithins, hydroquinones, and gallic esters. The use of synergists such as phosphoric, citric, or ascorbic acids are outlined. The reversion phenomena and the effects of ingestion of rancid fats are discussed. 43 references.

Fat deterioration in baked goods.

TOLLENAAR, F. D. *Bakkerij-Wetenschap, 2,* 70-6 (1949); *J. Am. Oil Chemists Soc., 28,* 36 (1951).

Baking at high temperatures generally reduces the keeping qualities of fats, and the final water content exerts a decisive influence; generally rancidity is inhibited at higher water contents. Most promising antioxidants are gum guaiac and dodecyl gallate.

A study of the use of nordihydroguaiaretic acid in dairy products. IV. Its antioxygenic properties in spray dried whole milk and ice cream mix with and without added synergists.

STULL, J. W., HERREID, E. O., AND TRACY, P. H. *J. Dairy Sci., 34,* 80-7 (1951).

A concentration of 0.1% nordihydroguaiaretic acid was found to retard the development of oxidized flavor in spray-dried whole milk during 12-month storage at room temperature. Methionine, ascorbic acid and citric acid acted synergistically. A concentration of 0.04% nordihydroguaiaretic acid will retard the development of oxidized flavor in spray-dried ice cream mix during storage at room temperature for 12 months.

FISH

Fish as raw material of new products and new processing.

NOTEVARP, O. *Tidsskr. Kjemi, Bergv. Metall., 10,* 189 (1949); *Food Sci. Abstracts, 23,* 21, No. 48 (1951).

The value and uses of Norwegian fish are reviewed with special reference to protein products, to herring meal and the substances recovered in stick-water, to fish oil, and to the possible significance to Norway of by-products (amino acids) manufactured in California.

FRUITS AND FRUIT JUICES

Additional note on the production of banana powder.

BOULAIS, J. *Fruits d'Outre-Mer, 4,* 66 (1949); *Food Sci. Abstracts, 23,* 53 No. 203 (1951).

Spray- and drum-drying of bananas was previously reported (see Fruits d'Outre-Mer, July, 1946). Spray-drying has been established, but it is a costly process, although it yields a high quality product. Drum-drying has now been satisfactorily developed. The new apparatus is described briefly. The chemical composition of the product is tabulated. The calcium: phosphorus ratio is relatively high. The taste of the yellow powder distinctly resembles that of ripe bananas. The powder can be used in the making of biscuits and similar products.

The enzyme system and browning of processed pears.

JAMES, D., AND CRANG, A. Rep. agric. hort Res. Sta., Long Ashton, Bristol, p. 234 (1948); *Food Sci. Abstracts, 23,* 50, No. 193 (1951).

The browning which occurs in cut raw pears, and sometimes in freshly opened bottled or canned pears, is due to oxidation of the catechol tannins by an oxidase system composed of a peroxidase and an organic peroxide. The catechol tannin content of the fruit varies with variety of pear and degree of ripeness, being greatest at the "firm ripe" stage recommended for bottling or canning. Oxidase activity increases up to about 150° or 160° F. (66° or 71° C.) and thereafter lessens owing to destruction of the organic peroxide; it ceases between 180° and 187° F. (82° and 86° C.). Slight peroxidase activity persists up to 200° to 210° F. (93° to 99° C.). The maximum internal temperatures occurring with different methods of processing, and the times taken to reach these maxima, are recorded. To avoid browning of bottled and canned pears on exposure to air, they should be rapidly heated to temperatures above the maximum for enzyme activity.

The role of nitrogen in fermentation. I. Changes in the nitrogen content of apple juice during fermentation.

CHALLINOR, S. W., AND BURROUGHS, L. F. Rep. agric. hort. Res. Sta., Long Ashton, Bristol, p. 182 (1948); *Food Sci. Abstracts, 23,* 58, No. 222 (1951).

Determinations of the nitrogen content and changes of specific gravity in fermenting juice of Bramley's Seedling apples showed that "nitrogen in solution" (which excludes suspended yeasts) diminished rapidly and at a constant rate until 80% was consumed. The remaining nitrogen appears to be not readily available to yeast. Approximately half the "nitrogen in solution" was utilized by the yeasts before vigorous fermentation or rapid fall of specific gravity had begun. During the latter half of the fermentation, "nitrogen in solution" tended to rise, presumably because of autolysis of yeast. Curves are given showing the total yeast present, yeast in the lees, and yeast in suspension, throughout the fermentation. Yeast in suspension increased with the fall of "nitrogen in solution," and had reached ¾ of its peak value before the end of the lag period of fermentation; after reaching its peak value, the amount of yeast in suspension decreased before the rate of fermentation fell off. Fermentation and growth of yeast at 25° C. were faster than at outdoor temperatures, but the total amount of yeast produced was the same; there was less autolysis.

The clarification of apple juice. The activity of pectase in some apple varieties.

KIESER, M. E., POLLARD, A., AND STONE, A. M. Rep. agric. hort. Res. sta., Long Ashton, Bristol, p. 228 (1948); *Food Sci. Abstracts, 23,* 58, No. 225 (1951).

Clarification of apple juice by the process of "defecation" or "keeving" is based on the precipitation of the pectin in the form of pectic acid or calcium pectate by the action of the enzyme pectase (pectin demethoxylase). Nitrogenous compounds and microorganisms are precipitated at the same time. Adequate

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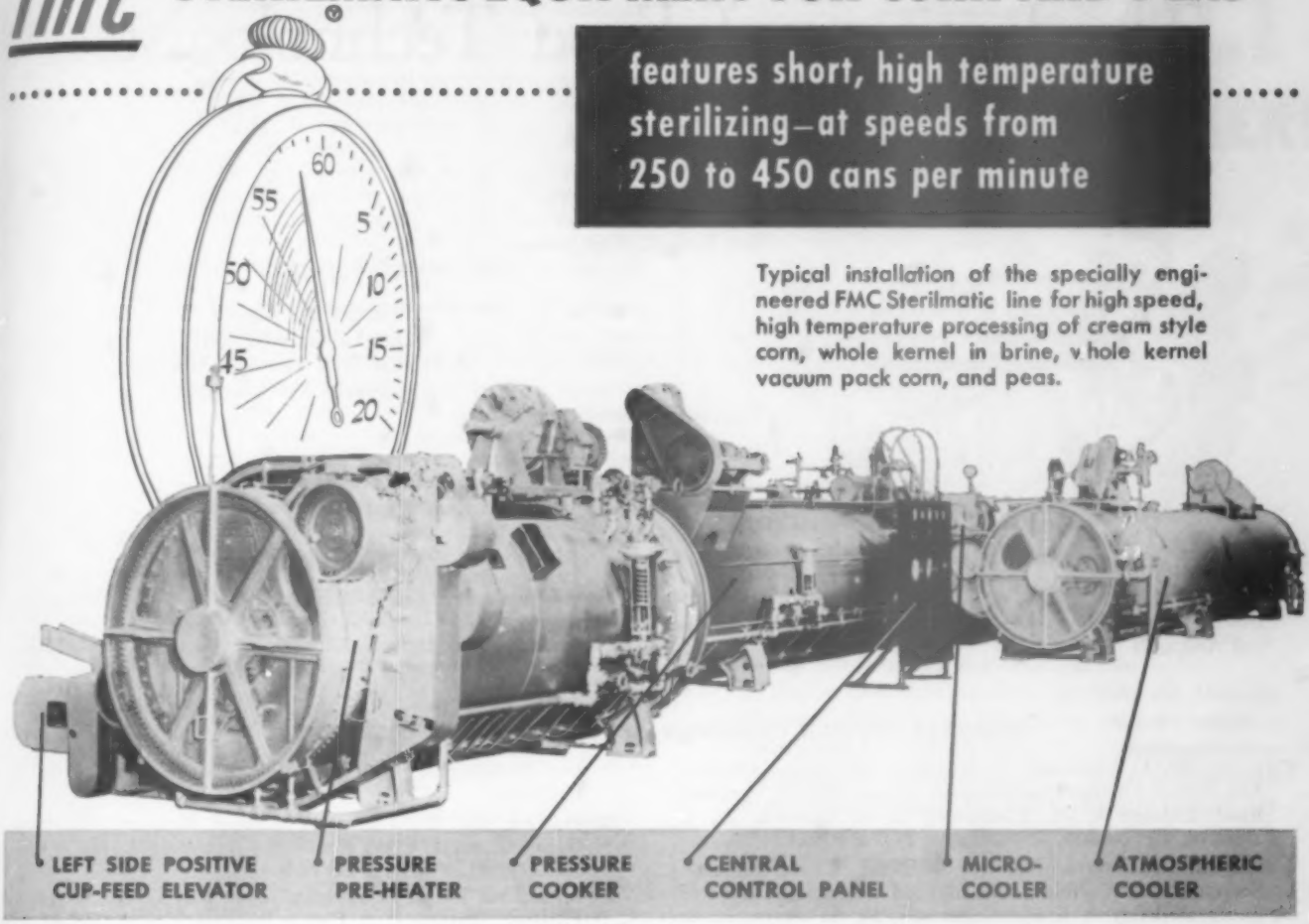

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Abstracts

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calcium is necessary, and a mixture of calcium carbonate and sodium chloride is frequently added. The pectase content of cider apples varies with the variety, and increases with maturity; extracts made at pH 6 contained more pectase than those made at pH 8; extracts made at pH 4 were inactive. Although pectase shows activity at pH 6 to 8, its effects on apple juice are exerted at pH 4 to 5. Precipitation of calcium pectate by pectase is much increased by addition of defecating salts; that it is not due to fermentation is shown by the similar precipitation in juice preserved with sodium benzoate. Clarification is slower when caused by natural pectase than by added enzyme preparations, and the precipitate is more bulky and difficult to separate.

Notes on apple juice production in Switzerland and France.

POLLARD, A. Rep. agric. hort. Res. Sta., Long Ashton, Bristol, p. 222 (1948); *Food Sci. Abstracts, 23,* 57, No. 220 (1951).

Production of apple juice in Switzerland is about 9 million gallons annually, compared with 17 million gallons of fermented cider (population 4½ millions). The bottled juice is sterile-filtered or pasteurized; it is sweet, and low in tannin, with about 0.5% of acid (calculated as malic acid). Pear juice is sometimes added. Apple juice and cider are made in the same factories, along with concentrated juices, pomace, pectin, vinegar, and distilled liquors. Some of the methods used are described. In France, production of apple juice is expanding, but is less important than in Switzerland. Emphasis is laid on the body or "fullness" of the juice, in contrast to the brilliant but thinner products favored in England and in Switzerland. Cider and apple juice are manufactured side by side, and much of the juice is used for blending with cider.

The pectase activity of apples.

POLLARD, A., AND KIESER, M. E. *J. Sci. Food Agric., 2,* 30-6 (1951).

A study has been made of the pectin-demethylating enzyme system in apple tissue and the level of activity compared with that in some other fruits. The apple varieties tested show considerable differences in their pectase content. The enzyme shows a maximum activity at pH 6.6: over the pH range of the fruit the activity is much lower, but the enzyme can still produce appreciable effects. Methods for the extraction and concentration of the enzymes are described. The concentrated enzyme preparations are readily inactivated by normal pasteurizing temperatures (68-70° C.), but in juices the enzyme shows a much greater stability. The significance of these findings is discussed in relation to the production of apple juice and pectin.

GUMS

A study of guar and its mucilages.

OSBORNE, G. E., AND LEE, C. O. *Bull. Natl. Formulary Comm., 19,* 4-11 (1951).

Investigation of possible uses of guar flour in pharmacy. Guar seeds are dry milled to produce a flour that has a galactomannan as a principal constituent, but no uronic acids. A 1% water mucilage is highly viscous, and unstable without preservative. Its emulsifying property is low. It has remarkable properties as a gelling agent and in combination with other gums it improves the stability of emulsions.

PATENTS (U. S. A.)

CHOCOLATE

Manufacture of chocolate.

VERDIER, A. L. 2,543,209, Feb. 27, 1951.

A process for the manufacture of commercial chocolate from crushed cocoa nibs comprising extracting the greater part of the cocoa butter content from the mass of crushed nibs, leaving a pasty residual mass, mixing the extracted cocoa butter with finely crushed sugar and with a large volume of additional cocoa butter at a temperature of at least 70° C., squeezing the cocoa butter-sugar mixture to bring the sugar content of the mixture to a desired value and then mixing a desired proportion of the

(Continued on page 20)

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Abstracts

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resulting cocoa butter-sugar mixture with the pasty residual mass.

ENRICHMENT

Nutrient compositions.

STEKOL, J. A. Assignor to International Minerals and Chemical Corp. 2,542,723, Feb. 20, 1951.

A composition of matter comprising a major amount of a homogeneous, proteinaceous food composition and an added minor amount of at least one inorganic salt of diacetyl-L-cystine.

Vitamin-enriched farinaceous material.

STECHER, P. G., AND JACKSON, W. R. Assignors, to Merck & Co., 2,540,302, Feb. 6, 1951.

A vitamin-enriched farinaceous material containing thiamin-tannate-gelatin complex.

FISH AND POULTRY

Apparatus and method for canning fish.

GORBY, J. 2,542,133, Feb. 20, 1951.

In a method of canning fish fillets: the steps of piling a quantity of fillets generally parallel to each other so as to form a series of fillets in transverse arrangement; feeding fillets in a direction longitudinally of their fibers; severing a mass of fillets from quantity transversely of their fibers; compacting mass with a predetermined maximum force applied transversely of fibers; severing a portion of compacted mass from the remainder of mass longitudinally of fibers; and compacting the remainder of mass by the application of predetermined maximum force applied transversely of fibers.

Apparatus for the recovery of crab meat from bony material by gravity liquid separation.

HARRIS, S. G., AND CARRINGTON, R. H. Assignors to The Blue Channel Corp. 2,545,517, Mar. 20, 1951.

An apparatus for recovering meat contained within or adhering to the ground bony material of crabs, which comprises a tank containing a body of liquid and having a pair of opposed side walls and an end wall, a transverse vertical partition within the tank adjacent to and spaced from end wall of the tank and with the latter partly defining a vertical passage, the partition stopping short of the bottom of the tank to form an orifice connecting the lower end of the passage with the remainder of the interior of the tank, means above the tank adjacent the partition and on the side thereof opposite to the passage for feeding the ground material into the liquid in the tank, means for introducing additional liquid under pressure into the lower end of the passage to create an upward current therein, an outlet in one side wall of the tank at a place remote from the passage for escape of liquid and buoyant material, means for leading from the top of the passage and away from the tank liquid and material, which is carried upwardly in current, and a mechanical conveyor for removing non-buoyant material from the tank through the liquid therein, the conveyor having an upper stretch beneath the feeding means and receiving material and discharging it through the orifice into the bottom of the passage in the path of the additional liquid introduced into the passage, the conveyor also having a lower stretch operating to advance the material from the bottom of tank adjacent the orifice and discharge it from the tank at a place remote from the passage and on the same side thereof as the feeding means.

Poultry picker.

MUELLER, JR., C. B. 2,543,372, Feb. 27, 1951. A poultry plucking machine including a cover or wall member having spaced elongated members defining a plurality of parallel passages, a rotatable drum disposed on one side of cover or wall member with its axis of rotation normal to elongated members and having flexible members projecting from its periphery, flexible members extended through passages and projecting from the other side of cover or wall member, each of flexible members having projections thereon adapted to engage poultry to be plucked.

FRUITS AND VEGETABLES

Processing apparatus for fruits and vegetables.

MCGIHON, L. Assignor to King Sales & Engineering Co. 2,545,159, Mar. 13, 1951.

Juice extracting apparatus comprising a cylindrical screen mounted with its axis upright and having its inner surface exposed, a rotor within the screen having hammer arms, a breaking and holding chamber above the screen, and means carried by rotor adjacent the top of the screen and marginally spaced from the inner wall of screen forming a bottom for the breaking and holding chamber and a restricted annular feed opening from the chamber to the screen with the opening partially overlying the ends of the hammer arms, annular opening being of substantially uniform radial dimension to limit the size of particle to be admitted to the exposed screen.

Method of and apparatus for extracting juice from whole citrus fruit and excluding atmosphere from contact therewith.

PIPKIN, W. A. 2,540,345, Feb. 6, 1951.

A method of expressing juice from whole citrus fruit which consists in: enclosing a juice-receiving chamber, having an opening therein, forming a hole in the rind of fruit, accomplishing a sealed communication between hole and opening while fruit is exposed to the atmosphere, filling chamber with an inert gas, and constricting fruit to reduce the volume thereof and express a relatively large portion of the juice therein outwardly through hole and opening into chamber by continuously applying compressive forces to all portions of the rind of fruit outside the area of hole at points sufficiently close to prevent the juice-bearing structure within fruit bursting outwardly through rind elsewhere than through hole.

Method of preparing cream-style corn.

LINK, H. L. Assignor to Food Machinery and Chemical Corp. 2,540,745, Feb. 6, 1951.

The method of preparing a coagulation-resistant cream-style corn which comprises severing caps of a measured depth from the corn kernels, blanching caps separately from the residual kernel portions, processing the scrapings from the residual kernel portions to form a corn cream, and adding blanched caps to cream.

Method for producing high-purity soybean protein.

RENNER, H. O. Assignor, by mesne assignments, to J. R. Short Milling Co. 2,543,467, Feb. 27, 1951.

A process of producing high purity proteins which process comprises extracting oil-free soybean flakes with an alkoxy ethanol, removing the extract from the residue, extracting the residual flakes in an aqueous solution of pH varying between 7 and 11 and removing the residue, acidifying the resulting extract, removing the resulting precipitated protein from the whey, and drying protein.

Machine for cutting potatoes or like objects into chips or slices.

ABBOTT, G. J. 2,545,720, Mar. 20, 1951.

A machine for slicing potatoes and like articles comprising a substantially cylindrical casing having an exit slot in its circumferential wall, a slicing knife forming one boundary of the exit slot, a movable support for the slicing knife, a rotor within the casing for carrying potatoes or like articles around the casing in contact with the inner surface of its circumferential wall, a slitting knife support pivoted to the casing, a plurality of slitting knives carried by the slitting knife support in advance of the exit opening and slicing knife and, when the slitting knife support is in its operative position projecting into the casing, yielding means for normally holding the slitting knife support and the slicing knife support in their operative positions in which they project into the interior of the casing but capable of yielding when a slitting knife is struck by a stone or other hard object, and an operative connection between the slicing knife support and the slitting knife support to cause the slicing knife and slitting knives both to be moved from the interior of the casing when a slitting knife is struck by a stone or like hard object.

MILK PRODUCTS

Modified milk product.

DANIEL, F. K. Assignor to Sun Chemical Corp. 2,542,633, Feb. 20, 1951.

A pure dairy product useful in dietetics comprising a material derived from milk and having per unit weight of solids, a substantially decreased proportion of sodium, potassium, lactose and chlorine and a substantially increased proportion of protein and calcium, as compared to the proportion of these materials present in milk, the ratio of protein to lactose being in approximate reverse proportion to the proportions of these materials present in milk, material being characterized by dispersibility in water.

NUTS

Almond shelling machine.

SMITH, W. F. 2,543,537, Feb. 27, 1951.

An almond shelling machine comprising a frame structure, a foraminous rotary cylinder, a relatively small diameter rotor within the cylinder in eccentric relation thereto, means mounting the cylinder and rotor on the frame structure for relative adjustment to alter the width of the space between the cylinder and rotor, and means to effect such adjustment and maintain the cylinder and drum set in any adjusted position.

PECTIN

Method of improving the solubility of low methoxyl pectin in liquids containing polyvalent metal ions, and pectin product suitable for making jellies with such liquids.

PEDERSON, K. Assignor to Kobenhavens Pektinfabrik v. Karl Pedersen. 2,540,545, Feb. 6, 1951.

A method of improving the solubility of low methoxyl pectin in such liquids containing polyvalent metal ions, in which it is normally difficultly soluble comprising adding to the liquid at least one alkali pyrophosphate.

SUGARS, STARCHES AND SPICES

Sucrose polyhydrate glazing of fruit.

YOUNG, F. E., AND JONES, F. T. Assignors to the U. S. A. 2,542,068, Feb. 20, 1951.

A process of glazing fruit which comprises coating a fruit with a suspension of sucrose polyhydrate crystals in sucrose syrup, then freezing the coated fruit.

Sugar crystallizer apparatus.

FELDSTEIN, H. H., AND KILBY, H. R. 2,540,250, Feb. 6, 1951.

A crystallizer comprising a shaft, a plurality of heat transfer coils carried in series on and completely supported at their ends by shaft, the delivery end of one coil being connected through shaft to the receiving end of the next coil, and said coils extending radially from shaft an appreciable distance, means for introducing a heat transfer medium to the starting end of the first coil and for withdrawing it from the discharge end of the last coil, a continuous helical stirrer scroll positioned radially within coils and axially inclined towards one end of shaft, stirrer scroll extending the length of shaft, arcuate stirrer means positioned radially outwardly of at least some of coils and axially inclined towards the other end of shaft, stirrer means being of substantially the length of shaft, a scraper bar positioned at both ends of shaft and extending radially therefrom, and a short arcuate stirrer secured to each of scraper bars, stirrer means being substantially diametrically opposed to stirrer scroll at all portions thereof.

Method of producing starch from starch milk.

ECKERS, C. G. Assignor to Aktiebolaget Separator. 2,543,660, Feb. 27, 1951.

In the treatment of maize starch milk containing fibers and gluten, in which starch milk is subjected to a first separating operation to separate it into components, one of which, the underflow, contains most of the starch, and the second of which,

(Continued on page 22)

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Abstracts

(Continued from page 21)

the overflow, contains fibers and gluten and some starch, and in which the starch underflow is diluted and subjected to a second separating operation to separate out an overflow containing some starch and most of the fibers and gluten, the improvement which comprises concentrating the overflow from the first separation in a locus of centrifugal separation to obtain a concentrate enriched in starch, at least some of which is entrained in gluten, combining last concentrate with the overflow from second separation, and feeding the resulting mixture to a centrifugal purifier and there subjecting it to an additional centrifugal separation which is relatively prolonged as compared with centrifugal concentrating operation and which provides a greater selective separating ability than operations, to recover the starch from the mixture.

Starch recovery.

FERRIN, H. Assignor to General Mills, Inc. *2,543,281*, Feb. *27*, 1951.

Process of separating wheat starch from wheat mill starch containing small traces of gluten, which comprises subjecting the mill starch to centrifugal separation, taken off an underflow having a gravity within the approximate range of 16-19° Baume, and subjecting the underflow to a second centrifugal separation and taking off an underflow having a gravity of from 17-21° Baume and which is substantially free from fiber, and an overflow containing fiber and a small amount of starch.

Condiment.

MILLER, W. A. Assignor to W. J. Stange Co. *2,543,250*, Feb. *27*, 1951.

A condiment which includes a major percentage of comminuted dehydrated onion a minor percentage of seasoning agent derivatives of spices, seasoning agent derivatives of spices being selected from the group of such derivatives which consists of oleoresins and essential oils and being intermixed with each other and coating the several particles of the comminuted dehydrated onion, condiment being characterized by its lack of tendency to cake or form lumps while awaiting use in a moisture-containing atmosphere.

FAMILY FOOD CONSUMPTION DATA PUBLISHED FOR THREE TYPES OF SOUTHERN FARMING AREAS

A recent publication, the seventh in the series of Southern Cooperative Bulletins and reporting work cooperatively conducted by home economists of the Agricultural Experiment Stations of Arkansas, Mississippi, South Carolina, Tennessee and Virginia deals with the above topic and presents an analysis of the 1947 food data in several counties in the above mentioned states. This information presented in this bulletin will be of interest to all who are concerned with food in the southern United States or who expect to conduct market surveys or introduce new products for sale in that section of the country. The detailed analysis of the purchased and home-produced foods is especially interesting. The food data are all related to the income of the people interviewed and the information collected includes the extent of food purchases while away from home.

The bulletin may be obtained upon request from the Experiment Stations of the cooperating states. (ZIK)

IMPROVED METHOD OF GLAZING FISH FOR LOCKER STORAGE

The glazing of fish by the usual method when prepared for storage in locker plants has been reported to be very expensive from the standpoint of both time and labor. A method has been suggested by a West Coast locker-plant operator which overcomes this extra handling and inconvenience. The results of tests using this suggested method conducted at the Branch of Commercial Fisheries' Fishery Technological Laboratory at College Park, Maryland, are discussed in Fishery Leaflet 321, *An Improved Method of Glazing Fish for Locker Storage*.

Using the improved method, the unfrozen fish are first wrapped in vegetable parchment, soaked in cold water for a few seconds, immediately wrapped in moisture-vapor-proof material, and then frozen. It was claimed that much of the water is retained within the package which upon freezing forms a rather heavy glaze around the fish.

Although the tests conducted were limited in scope, the author reports that a definite advantage in maintaining quality and reducing handling are the attributes of this improved method of glazing fish. This method of preparation would appear to be particularly adapted to locker plants and home freezers for fish that are small enough to be readily packaged. Under certain conditions, it may also be applicable to storage in warehouses, according to the author.

Copies of Fishery Leaflet 321 are available free upon request from the Division of Information, U. S. Fish and Wildlife Service, Washington 25, D. C.

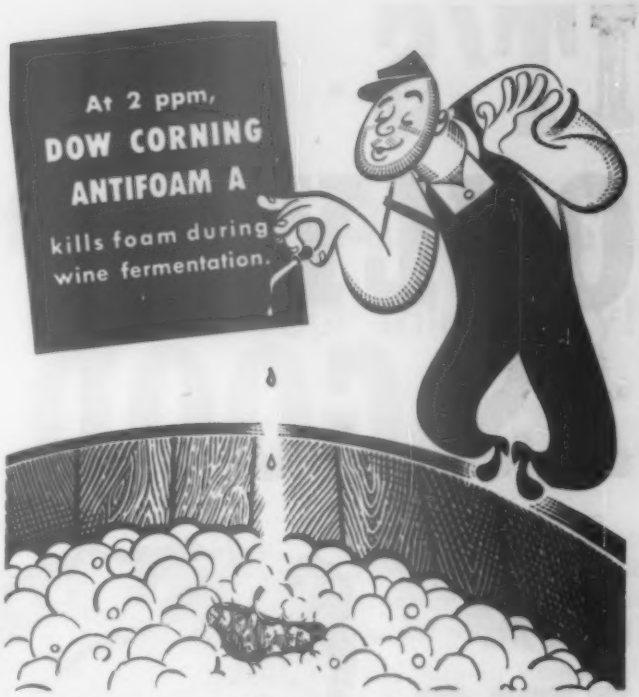
THE DARCY VARGAS FISHERIES SCHOOL, BRAZIL

The Darcy Vargas Fisheries School (Escola Técnica Darcy Vargas), located on Marambaia Island, state of Rio de Janeiro, in Brazil, was founded by a private charity foundation and the Brazilian Federal Government to provide the sons of Brazilian fishermen with elementary general education and with practical knowledge on commercial fishing.

The practical fishing course teaches the different fishing methods, including rudiments of navigation and boat handling, the manufacture of nets, construction and repair of fishing boats, and elements of processing, canning, and packing fish and its by-products.

The school is equipped with a fleet of boats of several sizes, a net factory, a boatyard, and an industrial fish plan. Some of the fish caught by the students are sold in public markets and some are used in the school fish plant, where salted, pressed, and canned sardines, dried shark filets, and shark-liver oil are produced. These products are also sold in public markets, giving the students the opportunity of becoming acquainted with the marketing of fish and fisheries products.

The school, which has a capacity for 1,200 students, had an enrollment of 300 students in 1948. It had then graduated three classes of fishermen. [From *FAO Fisheries Bulletin*, III (6) 143 (1950).]



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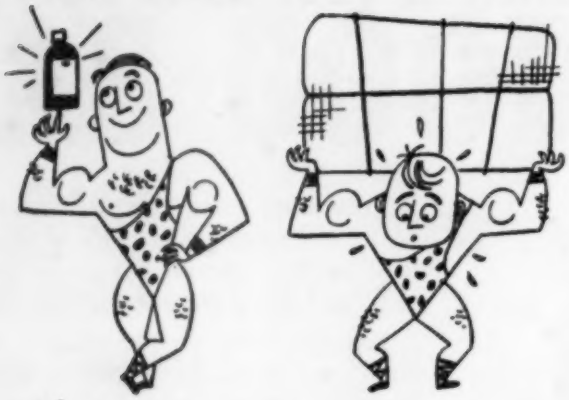

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PLANS BEING FORMULATED FOR 1952 IFT MEETING

The Program Committee of the IFT is now making plans for the 12th annual meeting to be held at Grand Rapids, Michigan, during the week of June 8, 1952.

Suggestions from the members of the Institute regarding sectional meetings or special topics that should be included in the next program are welcome. The Program Committee wishes to serve the membership as fully as possible and it is only through making desires known that a program can be developed that best serves the majority of the members.

Those voicing an opinion at the New York meeting indicated that emphasis should be placed on research papers, but that a few review papers that do not duplicate fields covered previously may be acceptable.

Your Program Committee hopes to have the general framework for the 1952 convention developed by September and must have titles for all papers before the end of this calendar year.

Suggestions for sections, papers and speakers should be sent to Dr. Roy E. Marshall, Chairman of the Program Committee, Room 101, Agricultural Building, Michigan State College, East Lansing, Michigan.

FUTURE DATES FOR FOOD TECHNOLOGISTS

1951

Aug. 6-10	Food and Nutrition Sessions, Gordon Research Conference, AAAS. Colby Junior College, New London, N. H.
Sept. 8-13	XIIth International Congress of Pure and Applied Chemistry. New York, N. Y.
Sept. 10-14	American Society of Horticultural Science, Annual Conference, University of Minnesota, St. Paul, Minn.
Sept. 26-29	International Association of Milk and Food Sanitarians. Glenwood Springs, Colo.
October	International Association of Ice Cream Manufacturers. Detroit, Mich.
October	International Canning Conference. Paris.
Oct. 1-3	Association of Official Agricultural Chemists. Shoreham Hotel, Washington, D. C.
Oct. 1-4	Society of Industrial Packaging and Material Handling Engineers, Annual Exposition, Cleveland, Ohio.
Oct. 8-10	American Oil Chemists' Society, Fall Meeting, Chicago, Ill.
Oct. 22-24	Packaging Institute, 13th Annual Forum, Hotel Commodore, New York, N. Y.
Oct. 24-26	National Pickle Packers Association, Annual Meeting, Sheraton Hotel, Chicago, Ill.
Nov. 5-8	Refrigeration and Air Conditioning Exposition, Navy Pier, Chicago, Ill.
Nov. 12-15	American Bottlers of Carbonated Beverages. Annual Meeting. Armory, Washington, D. C.

1952

June 8-12	**Institute of Food Technologists, Twelfth Annual Meeting, Grand Rapids, Mich.**

(Information concerning future dates of national and international meetings, conventions and exhibits of interest to food technologists should be sent to the editorial office.)

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The Institute of Food Technologists assumes no responsibility for statements in contributed articles appearing in FOOD TECHNOLOGY. Editorials present only opinions of the writers and do not necessarily reflect policies of the Institute of Food Technologists.

Charles N. Frey

President, Institute of Food Technologists, 1951-1952

Charles N. Frey was born in Hopkins, Michigan, in 1885. He attended grade school at South Haven, Michigan, and high school at Wayland, Michigan, also Robert Waller High School, Chicago. After obtaining his B.S. degree at Michigan State College in 1911 he returned to teach science at the South Haven High School.

While teaching he worked part time with the U. S. Department of Agriculture on the problem of toxic effects of certain sprays being used on local orchards. He gave up teaching after three years for graduate work for his Ph.D. degree at the University of Wisconsin, but continued working part time for the U. S.

CHARLES N. FREY

Department of Agriculture on the powdery scab of potatoes, a disease causing serious crop destruction, and later on the potato blight disease and fungus disease of apples for the Wisconsin State Department of Agriculture. These activities were interrupted by World War I when Dr. Frey served as Lieutenant and later as Captain on the Army food and nutrition staff. The war over, he returned as an instructor to the University of Wisconsin and in 1920 obtained his Ph.D. degree in the field of organic and physiological chemistry.

Upon graduating he obtained a fellowship at the Mellon Institute in Pittsburgh to work on yeast and baking problems. After two years he left the Mellon Institute to become a research chemist for the Ward Baking Company in New York City. He assisted in the development of Vitovim bread and of Vitavose B complex extract of wheat germ. He and Dr. Hildebrandt also developed a process for growing yeast on cane molasses—a plant was built at Warren, Ohio. He was also associated with the early work on Arkady dough improver.

In 1924 he was appointed Research Chemist at the Fleischmann Laboratories and in 1925 he became Research Director. When the Fleischmann Company was reorganized as a part of Standard Brands Incorporated, he became the Director of Research for Standard Brands Incorporated. In 1944 he became Director of Scientific Relations, a position he has held until his recent retirement on May 1, 1951.

At Standard Brands Incorporated he directed research and as author or co-author published over 100 papers and 68 patents in the fields of nutrition and baking technology. More specifically, he and his associates discovered methods of preparing a stable active dry yeast, of using carbamides for growing yeast and of determining vitamins B_1 and B_6 by means of yeast. Other contributions of his group include a method of using cane molasses in yeast growing, the discovery that enzymes in soyabeans oxidize vitamin A or carotene, commercial methods of producing vitamin D from yeast and a method of producing high vitamin B_1 yeast.

Dr. Frey served as chairman of the New York section of the American Chemical Society in 1943; was president of the American Association of Cereal Chemists in 1942, chairman of the Division of Agriculture and Foods, American Chemical Society, 1942-43. He was a delegate to the International Technical and Chemical Congress, Belgium in 1935; Holland, 1937 and Hungary, 1939. He received an honorary Doctor of Science degree from Michigan State College, 1946.

Dr. Frey was a member of the Food and Nutrition Board, National Research Council, 1942-1946. At present he is a member of the Committee on Cereals, Food and Nutrition Board; member of the Committee on Survey of Science, Research and Development Board, National Research Council, 1942; Fellow, American Association for the Advancement of Science; member of American Chemical Society, Society of American Bacteriologists, Institute of Nutrition, American Institute of Chemists, Society of Chemical Industry, Institute of Food Technologists, American Oil Chemists' Society, American Association of Cereal Chemists, Wisconsin Academy of Sciences; Fellow, New York Academy of Sciences.

Dr. Frey married Julia Lenore Leary in 1920; they have three children, two daughters — Martha Anne, Florence Elizabeth, and one son—Charles Frederick.

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News of the Institute

FOOD AND AGRICULTURE

Presidential Address by Paul F. Sharp

Delivered at the Eleventh Annual Meeting of the IFT
New York, N. Y., June 18, 1951

A little over 100 years ago, two out of every three people of our country derived their income directly from the land. Today, less than one out of five work on the land and, in California, only about one in ten. This change has been brought about by improved practices and by labor-saving devices. The labor thus released from the farm is used, in turn, to manufacture those labor-saving devices as well as many other items for our comfort and pleasure.

In the United States today, we have 37 million fewer acres devoted to agriculture than we had fifty years ago, and yet our agriculture is feeding twice as many people. Land has been withdrawn from agricultural use for the expansion of cities, construction of highways, and for parks, and has been submerged as a result of the construction of dams and reservoirs.

Three factors account for our ability to feed more people on the reduced amount of land:

1. The conversion, on the farms, from horses to tractors has resulted in the release of 60 million acres from the production of feed for horses to the production of food for humans.
2. People are eating much less because they are working only about half as hard as formerly. The work week has been reduced from 72 hours to 40 hours or less. The work now consists mostly of punching buttons or pulling levers.
3. The land is producing more as the result of research in the development of new and improved crops, better cultural practices, use of irrigation and fertilizers, and better control of diseases, insects, and weeds.

The problem that faces us in the future is that of producing still more food from an ever-shrinking amount of agricultural land. The change from horses to tractors on the farms is about complete, and little increase of land from this source can be expected in the future.

During the period of the last 100 years, fuel- and water-produced energy has increased from 6% to 91% of our total energy supply, whereas animal-produced power decreased from 79% to about 5%, and human energy used for power decreased from 15% to 4%. The increase in the use of mechanical energy over the last 100 years, plotted against the increase in national income, corrected for devaluation of the dollar and inflation, correlates almost perfectly. This means that our gains in income, both on the national basis and individually, may be interpreted as being due almost solely to our ability to develop and use mechanical energy. These gains in our national income and wage scale have resulted from the social system which has permitted financial rewards to accrue to the individual as a stimulus to extra individual effort. The result has been the enormously increased production capacity per man-hour of labor through utilization of mechanical energy and machinery.

The reduction in daily caloric intake from the high levels cited by Atwater 60 years ago of 7,000 to 8,000 calories for men doing heavy labor common in those days to the present levels of 3,200-4,500 will probably not proceed much further. Our future in feeding the people of the nation lies along one of two lines: either (1) research to improve the production of the remaining agricultural land, or (2) shifting our food habits from secondary to primary products of the soil, i.e., eating the corn instead of feeding the corn to the hogs and eating the hogs.

In this country, we have applied our mental resources to the problem of making our job easier, or to accomplishing more with the same expenditure of time and effort. In the beginning, as previously stated, most of our people were engaged in the activity of producing food. As ways and means were developed to multiply the effective use of man-power on the farm, labor was released from agriculture for use in other activities. The labor released from agriculture found employment in the production of articles for our pleasure and convenience, such as better houses, automobiles, refrigerators, radios, television, and electrical devices of all sorts. The release of labor from agriculture and the development of industries occurred simultaneously and progressively, so that at no time was there a serious disorganization of labor utilization.

In general, there has been a continuous demand for increased labor in our industries. As our population increases, the prosperity of our country depends upon a continued expansion of industries of all kinds. Any slacking-off of industry always has an adverse effect upon agriculture and the food industry, and starts a trend away from the more nutritious secondary products of the soil, meat, eggs, milk and fruits, and toward its primary products, potatoes and cereals.

The industrial development of our country depends upon mass production, the development of large manufacturing units requiring elaborate machines and the use of large amounts of mechanical energy. In this way, one set of laborers produces large numbers of manufactured articles at prices that other laborers can afford to pay. In order to accomplish efficiencies of mass production, a large number of laborers must be gathered together in one area. Urban living thus deprives them of the opportunity to produce their own food. The production of food has become a specialized activity just the same as the making of an automobile. The city laborers must be supplied throughout the year with various food products—meat, eggs, milk, fruits, vegetables, and cereals. Therefore, the foods produced in the farming areas must be made available to laborers in city areas on a year-around basis. A vital link in this chain has been the development of transportation, refrigeration, and the food processing industries.

The various food industries assume the task of getting the food produced on the farms to the cities in as acceptable a form and condition as possible, with a minimum loss in nutritive value. In so far as it is practicable they attempt to provide the consumer with a supply of certain foods throughout the year by utilizing

(Continued on page 8)

HANDLES FLUID FOODS
SAFELY • SIMPLY • SPEEDILY

No "cream-puff" application is Wagner Baking Company's use of TYGON TUBING. Throughout their plant, this glass clear, plastic "pipe" is used to convey milk and egg mixtures, pie fillings, and pie toppings. Some of these are surprisingly corrosive — all are sensitive to the slightest contamination.

SAFETY: The non-toxicity and negligible extractibility of TYGON Beverage TUBING insures complete safety in the handling of the most sensitive foods or liquids. The permanently glass-like inner surface guarantees complete cleaning. Both bactericidal treatments or steam sterilizations are possible.

SIMPLICITY: The long-lasting flexibility, light weight and abrasion resistance of TYGON TUBING make it easy to use. A few simple connections and you can go anywhere in the plant — around corners, up to the ceiling, down to the floor. It's practically kinkless, too.

SPEED: TYGON TUBING speeds fluid transmission from start to finish. The smooth inner wall gives easier connections, faster flow, quicker cleaning. The high clarity permits rapid inspection — better flow control.

TYGON
flexible plastic
TUBING

TYGON TUBING is made in standard or specially sized bores up to 2" ID. Outer braid reinforcement is also available for pressure applications. Write, today, for the free Bulletin T-77 containing complete technical information. Address: U. S. STONEWARE, Akron 9, Ohio.

News of the Institute

(Continued from page 6)

such processes as freezing, canning, drying, preserving, etc. Thus, the city dwellers, even though removed from areas of agricultural production, are supplied with these products, perhaps even to a greater extent than if they were living on farms, producing their own food.

As a result of the development of transportation and the processing industries, and as a result of the high incomes paid to labor in industrial centers, people are, in general, better fed today than formerly. This is evidenced by the increased per-capita consumption of foods of high nutritional value, such as meat, eggs, milk, fresh fruits, and vegetables.

There is a definite relationship between types of food consumed and family incomes. Where the family income is relatively high, there is a greater consumption of foods of high nutritive value than when the family income is low.

The prosperity of our country depends upon such things as prosperous and expanding industries, and the production of more food on less land.

Continuous and expanding research along all lines is necessary if we are to keep this economy of ours on the up-grade. We should take stock of our research and mental resources. If we take patents as a measure of our new ideas, the patent applications filed and also patents granted in relation to population increase started to fall off about 30 years ago. Have we already begun to slip?

Regional Section News

FLORIDA SECTION

The Section held its June meeting on June 7th at the Rochelle Restaurant, Lake Alfred. Dr. A. F. Camp, vice-director in charge of the Citrus Experiment Station at Lake Alfred, spoke on the "Citrus Industry of Argentina and Brazil," at the same time illustrating his talk with color slides. Dr. Camp has made several trips to South America where he has studied the problems of the citrus industry, especially in relation to the Florida citrus industry.

Officers elected for the year, 1951-52 are as follows:

Chairman: F. W. Wenzel, Citrus Experiment Station, Lake Alfred, Fla.

Vice Chairman: Gray Singleton, Lakeland, Fla.

Secretary-Treasurer: Roger Patrick, P. O. Box 403, Winter Haven, Fla.

Section Councilor: V. C. Praschan, Juice Industries Division, Clinton Foods, Inc., Dunedin, Fla.

Executive Committee: G. N. Pulley, Roger Patrick, C. H. Brokaw, A. R. Pobjecky, and W. R. Roy.

NORTHERN CALIFORNIA SECTION

Mr. H. S. Hazleton of the General Electric Co. presented a talk on "Lighting for Food Plants" to the June 14 meeting of this Section. His address was replete with demonstrations of the various light sources, both for illumination and ultra-violet lamps for sterilization. Illumination engineer for the Pacific Division of GE, the speaker was a member of the Subcommittee on Lighting in the Canning Industry of the Committee on Lighting Study Projects in Industry of the Illumination Engineering Society. The subcommittee prepared the first authoritative manual on the subject, titled "Lighting for Canneries" which was published in January, 1950. In connection with the preparation of the manual, Mr. Hazelton visited a number of canning plants across the country to survey their illumination requirements. The Section was fortunate to hear such an eminently qualified speaker on the subject.

According to the Section's official mouthpiece, "The Hornblower," (May-June edition), the August meeting is to be addressed by George Short, general sales manager, General Foods Inc. The October meeting will hear talks by NCA personnel.

The Annual Picnic was held on June 9 at Alum Rock Park.

OREGON SECTION

On May 26th, the Oregon Section met at Oregon State College, Corvallis. The following graduate students gave papers on fundamental and applied food research conducted by them at the College:

Jayantital Shah, "Color Estimation of Frozen Strawberries with Spectrophotometer, Reflectionmeter, and Visual Grading." Robert P. Streiff, "Swiss Cheese Manufacture." Martha E. Jooste, "Cake Structure and Palatability as Affected by Emulsifying Agents and Baking Temperatures." J. Richard Brock, "Comparison of Treatments for Extension of Storage Time on Frozen Pink Salmon and Methods of Evaluation."

Officers and Executive Committee members elected for the 1951-52 fiscal year are as follows:

Chairman: George A. Richardson, Dairy Department, Oregon State College, Corvallis, Oregon

Vice Chairman: Charles L. Beardsley, Apple Growers Association, Hood River, Oregon

Secretary-Treasurer: Clifford E. Samuels, Food Technology Department, Oregon State College, Corvallis, Oregon

Executive Committee:: Ruth C. Miller, Food Technology Department, Oregon State College (One Year); Alton C. McCully, Eugene Fruit Growers Association, Eugene; H. Y. Yang, Food Technology Department, Oregon State College.

PUGET SOUND SECTION

As a result of our recent balloting, the following officers were elected for 1951-52:

Chairman: T. L. Swenson

Vice Chairman: A. F. Bucholtz

Secretary: Glenn M. Danielson

Treasurer: Raymond M. Way

National Councilor: Charles R. Stumbo

Executive Committee: Lawrence Newsome and Terrence C. Webber

PERSONNEL

Byron H. Webb, former principal dairy technologist in the U. S. Bureau of Dairy Industry, which he

(Continued on page 16 following technical papers)

A few of the many technical packaging achievements which have helped bring more profits to many industries and more pleasures into many lives.

1. Canco made possible the first commercial application of the vacuum-pack and vacuum-closure principles to the canning of vegetables.

2. Canco established the first Nutrition Laboratory devoted solely to the problems of the canning industry.

3. Canco established the first specifications for the chemical composition of steel used in the manufacture of corrosion-resistant tin plate.

4. Canco discovered the cause and control of a widespread type of off-flavor spoilage in tomato juice, due to an organism which Canco isolated and named.

5. Canco invented the Tenderometer which provides a means of quality control of raw green peas.

6. Canco published the first of a series of education texts on nutritive values and public health aspects of canned foods.

7. Canco publishes the one and only "Canned Food Reference Manual" (3 editions) now widely used in schools and colleges and by the medical and public health professions.

8. Canco first established a system of tempers for tin plate to produce better formed and stronger cans.

9. Canco invented the "High-Short" aseptic closing systems of canning for liquids and for solids.

10. Canco first applied commercially the new Agitation principle in the vacuum packing of vegetables.

11. Canco pioneered and developed the low-oxygen closure (L.O.C.) method for fruit juices and beer.

1901—50TH ANNIVERSARY—1951

CANCO

AMERICAN CAN CO.

New York • Chicago • San Francisco • Hamilton, Canada

1951 Annual Business Meeting

ANNUAL REPORT OF THE SECRETARY, TREASURER AND OF THE EDITOR

(The following condensed reports will be of interest to the membership of the IFT. Much more extensive, and complete reports have been presented to all Councilors prior to the Annual Meeting.)

FROM THE SECRETARY'S ANNUAL REPORT FOR 1951-1952

MEMBERSHIP STATUS:

Total Membership, April 30, 1950	2,910	
Reinstatements and new members elected May 1, 1950 to April 30, 1951	633	
TOTAL		3,543
Losses:		
Deaths and Resignations	81	
Dropped, non-payment	254	
TOTAL LOSSES	335	
BALANCE, APRIL 30, 1951	3,208	
TOTAL		3,543
Professional Members	2,256	
Members	752	
Student Members	200	
BALANCE	3,208	

CHARLES S. LAWRENCE,
Executive Secretary

FROM THE TREASURER'S REPORT FOR 1951-1952

Cash Balance, May 1, 1950		$26,749.03
Cash Receipts:		
Membership Dues	$23,683.78	
Food Technology—Subs. and Adv.	27,227.96	
Food Research—Subs. and Adv.	9,183.55	
Rent of office space and equipment	511.94	
Refund on travel vouchers	2.55	
Refund on editorial expense	186.17	
Annual Meeting	4,000.00	
Cash Sale—Back No's. of Journals	94.31	
Sale of Mailing Lists	1,257.15	
Sale of Emblem Seals	19.00	
Refund—Nat. Res. Council on expense of Scientific Register	105.19	
Miscellaneous Cash Receipts	1.44	66.273.04
TOTAL		$93,022.07
Cash Disbursements:		
Rent, Telephone and Telegraph	1,947.20	
Clerical Expense	2,862.16	
Secretary's Salary	4,560.00	
Withholding and Payroll Taxes	496.30	
Stationery, Printing and Postage	2,745.39	
Travel	552.63	
Food Technology, Prod., Adv. and Circulation	31,457.58	
Food Research, Prod., Adv. and Circulation	3,220.12	
Refunds, overpayment of dues	116.15	
Expenses of Editor's Office	5,340.00	
Annual Meeting	144.03	
Audits and Surety Bond	137.50	
Accrued Expenses	46.34	
President's Office	63.58	
Expenses—Sale of Back No's. of Journals, Postage and Packaging	331.46	
Expenses—Sale of Mailing Lists	233.46	
Furniture and Equipment purchased	1,028.54	
Expense of Nat'l. Scientific Register dist.	700.40	
Purchase of Seals for sale	93.20	
TOTAL DISBURSEMENTS		$56,076.04
CASH BALANCE, APRIL 30, 1951		$36,946.03

P. K. BATES,
Treasurer

FROM THE EDITOR'S REPORT TO THE COUNCIL

The budget of $3,600.00 adopted for 1950-51 in May 1950 for the editorial offices proved insufficient for the two journals. At the request of the editor the Council doubled the monthly allotment of the editor's office effective January 1, 1951. Thus, since that time the editorial offices have received funds at the annual rate of $7,200.00.

With the change of editorship it became necessary that the Institute purchase various equipment (wire recorders and file cabinet) for the use of the editorial offices.

During the year June 1, 1950-May 31, 1951, the editorial offices of FOOD TECHNOLOGY and FOOD RESEARCH received a total of $5,100.00. The major expenditures during this year are listed below, together with the estimated expenditures during the year 1951-1952.

	1950-51 (actual)	1951-52 (estimated)
Office expenses (heat, light, etc.)	$ 120.00	$ 120.00
Supplies, upkeep of equipment, miscellaneous	180.00	240.00
Secretary-Stenographer (full time, including incidental additional help and Social Security payments)	2,148.00	2,600.00
Editorial Assistance (part time help for technical editing of manuscripts)	304.75*	2,000.00
Printing and mimeographing	488.60	400.00
Postage	461.00	600.00
Telephone and telegraph	120.00	200.00
Editor's travel expenses and honorarium	1,277.65	
	$5,100.00	

* Since February, 1951.

Z. I. KERTESZ,
Editor, *Food Technology, Food Research*

1951 COUNCIL MEETING PROCEEDINGS

The following are the proceedings of the Council held at the Hotel New Yorker, New York City, N. Y., June 17, 1951:

Meeting was called to order by President Paul F. Sharp at 10:00 a.m. A quorum as required by the constitution of the IFT was in attendance throughout the meeting. The Council received and acted upon the following recommendations from the Executive Committee:

1. That a Committee be appointed to study the problem of handling exhibits at Annual Meetings—it being assumed that National Headquarters will take over some of the details of the sale of exhibit space and the production of the program. The Committee will recom-

(Continued on page 12)

YOU CAN'T IMPROVE ON NATURE!

Cruickshank from National Audubon Society

Peach-like fruit of nutmeg tree, showing nutmeg (kernel of fruit) and mace (fleshy covering of nutmeg).

For taste appeal,
eye appeal, and
buy appeal
...use spices

Naturally

AMERICAN SPICE TRADE ASSOCIATION

80 WALL STREET NEW YORK 5, N. Y.

1951 Annual Business Meeting

(Continued from page 10)

mend a detailed procedure including the distribution of proceeds between the host section and National Headquarters. The Council feels that there should be a percentage distribution with a ceiling placed upon the amount to go to the section. This committee will be instructed to render its report within six months.

2. That a Directory of the Institute be published at three-year intervals. The Directory to be available to members at approximately the cost of production which is estimated at $1.00 per copy. This price to apply only on orders received in advance of printing—all purchasers after publication to pay not less than $1.25 per copy. All members receiving the Directory to be required to certify that it is for their personal use and not to be used by themselves or others as a mailing list. All copies of the Directory to be numbered and a register kept of those receiving the Directory. It was moved, seconded and carried that this be done and that the next issue of the Directory be published in 1952.

3. That the formal invitation from the Ohio Valley Section to hold the 1955 Annual Meeting at Columbus, Ohio, be accepted, the facilities being adjudged adequate and acceptable. It was moved, seconded and carried that this invitation be accepted.

4. That the offer of the Monsanto Chemical Company to finance an award of $100.00 cash to go to the individual making the best presentation of a paper at each of four (4) Annual Meetings beginning with the 1951 meeting be accepted. The award to be made on the basis of excellence of presentation rather than subject matter and that a committee be appointed to set up the mechanics for determining the Awardee and that the name of the recipient be announced in FOOD TECHNOLOGY. It was moved, seconded and carried that this be done.

5. That a Standing Committee be appointed to study and prepare procedures for the acceptance of gifts, donations or endowments to be expended under the provisions of Article XIII, Section 6 of the Constitution of the Institute. All acceptances to be made by the Council. It was moved, seconded and carried that the foregoing be done.

6. That a committee be appointed to study the problem of publicity and public relations and to recommend means whereby the membership can be of assistance in furthering public relations and publicity. It was moved, seconded and carried that this be done.

7. That the following Budget for the fiscal year 1951-1952 be adopted:

RESOURCES:

Cash		$ 36,940.03
U. S. Savings Bond		797.00
Accounts Receivable		668.51
Estimated Income:		
Membership Dues	$23,500.00	
Non-Member Subs.—FOOD TECHNOLOGY	3,450.00	
Subscriptions—FOOD RESEARCH	9,431.00	
Advertising—FOOD TECHNOLOGY:		
Gross Billing	$30,000.00	
Less 15% and 2% disc. to agencies	5,010.00	
Net Billing		24 990.00
Advertising—FOOD RESEARCH:		
Gross Billing	1,500.00	
Less 15% and 2% disc to agencies	250.50	
Net Billing		1 249.50
Income from Annual Meeting		2.000.00
Sale, Back Nos. of Journals		600.00
Sale, Mailing Lists		500.00
Miscellaneous Receipts		500.00
Dues from membership increase		4,000.00
Total Estimated Income		70,220.50
TOTAL RESOURCES		$108,626.04

ESTIMATED EXPENDITURES:

FOOD TECHNOLOGY—Printing and Mailing	$27 600.00
FOOD RESEARCH—Printing and Mailing	7.800.00
Advertising Commissions	6.250.00
Circulation expense—both journals	1 800.00
Rent, Telephone and Telegraph	1.800.00
Stationery, Printing and Postage	2.500.00
Clerical Expense	3 600.00
Secretary's Salary	7,200.00
Gen'l Exp. Secretary's Office	1.200.00
Payroll Taxes	250.00
President's Office	600.00
Editor's Office	7.200.00*
Office Furniture and Equipment	500.00
Travel	1,000.00
Contingencies (to be expended only by Pres.)	1,000.00
TOTAL ESTIMATED EXPENDITURES	70 300.00
ESTIMATED BALANCE, April 30, 1952	$38,326.04

* This item includes editorial assistance, clerical expenses, stationery, printing and postage, telephone, telegraph, office supplies, rent, lights, etc.

It was moved, seconded and carried that the Budget be adopted and that the Executive Committee be authorized to make such increases in the allowance to the Editorial Office as it deems necessary.

8. That the set of By-Laws covering the operations of the various activities of the Institute submitted by the Constitution Committee and modified by the Executive Committee be adopted. It was moved, seconded and carried that this be done and that the complete By-Laws be published in FOOD TECHNOLOGY at the earliest possible date.

9. That the offer of the Maryland Section to subsidize student memberships of that Section to the extent of the deficit incurred by the Institute in carrying these memberships at the present rate of student dues, be not accepted but that a vote of thanks be extended to the Maryland Section for this generous offer. It was moved, seconded and carried that this be done.

(Continued on page 14)

Congratulations to the Food Industry of America

Enriched foods mean better living for the American people. Ten years ago, when American millers and bakers introduced enriched flour and bread, they launched a new era in nutrition.

Since then, faith in the Enrichment Program has been reaffirmed many times. The human values of enriched foods have been factually established in terms of higher health levels and improved mental and physical vigor.

As we enter the second decade of Enrichment, Merck salutes the Baking and Milling Industries of America for this accomplishment.

MERCK VITAMIN PRODUCTS FOR ENRICHMENT AND FORTIFICATION:

VITAMIN B_1

Thiamine Hydrochloride (*Vitamin B_1 Hydrochloride*)

Thiamine Mononitrate (*Vitamin B_1 Mononitrate*)

RIBOFLAVIN (*Vitamin B_2*)

NIACIN (*Nicotinic Acid*)

ASCORBIC ACID (*Vitamin C*)

Merck Enrichment Ingredients for Millers, Bakers, Cereal and Macaroni Manufacturers —Merck Vitamin Mixtures for Flour Enrichment—Merck Bread-Enrichment Wafers—Merck Vitamin Mixtures for Corn Products Enrichment—Merck Vitamin Mixtures and Wafers for Macaroni Enrichment.

Merck is Proud to Have Played a Part in the Enrichment Program

For several years before the birth of Enrichment, Merck research and production staffs had been at work on the synthesis and manufacture of thiamine, riboflavin, niacin, and other pure vitamins. When they were needed for the Enrichment Program, as well as for general food fortification, Merck was ready.

We are proud to have been associated with the food industry throughout these ten historic years of Enrichment.

MERCK VITAMIN PRODUCTS

For Enrichment and Fortification

MERCK & CO., INC.
Manufacturing Chemists
RAHWAY, NEW JERSEY
In Canada: MERCK & CO. Limited—Montreal

1951 Annual Business Meeting

(Continued from page 12)

10. The Annual Reports of the Executive Secretary and the Treasurer were received. It was moved, seconded and carried that these reports be accepted and that they be published in FOOD TECHNOLOGY.

11. There being no further recommendations from the Executive Committee, the Council proceeded to other business.

12. A resolution was received from the Indiana Section requesting that membership certificates suitable for framing be issued to all present and future members. It was moved, seconded and carried that no action be taken at this time but the matter was referred to the Executive Secretary to make a study and report on the cost of issuing such certificates.

13. It was moved, seconded and carried that matters placed before the Council for action by mail vote first be submitted to the Executive Committee and the recommendations of that Commitee be carried on the ballot sent to Councilors.

14. A petition was received from a group of members in the Pittsburgh area requesting the issuance of a charter for a regional section of the Institute to be known as the Pittsburgh Section. It was moved, seconded and carried that this charter be issued.

15. It was moved, seconded and carried that a charter be issued to a Student body at Oregon State College to be designated as the Ernest H. Wiegand Student Chapter.

16. It was moved, seconded and carried by unanimous ballot that Charles S. Lawrence be appointed Executive Secretary for the fiscal year 1951-1952.

17. It was moved, seconded and carried by unanimous ballot that Philip K. Bates be appointed Treasurer for the fiscal year 1951-1952.

18. It was moved, seconded and carried by unanimous ballot that Bert S. Clark be appointed Assistant Treasurer for the fiscal year 1951-1952.

19. It was moved, seconded and carried that the Executive Secretary, the Treasurer, and the Assistant Treasurer be bonded in the amount of $25,000.00 each.

20. It was moved, seconded and carried that a Standing Committee on Publications be appointed by the President. This Committee to make recommendations on policy governing all of the operations of Institute publications.

21. A resolution was received from the Maryland Section urging closer cooperation by the Institute and governmental agencies and the appointment of a national committee to effect this. It was moved, seconded and carried that no action be taken on this resolution.

22. A tentative invitation was extended by the Florida Section to hold the 1956 Annual Meeting at Miami, Florida. Since this invitation was not definite, no action was taken.

23. It was moved, seconded and carried that the President appoint a Resolutions Committee to draw up resolutions expressing the appreciation of the Institute to various individuals and organizations for their contributions to the success of the present meeting and present such resolutions at the Business Meeting on Wednesday, June 20.

24. The terms of Dr. Clark, Dr. Frey, and Dr. Harvey as members of the Babcock Award Committee having expired, the Council elected Emil M. Mrak, Arthur N. Prater, and Carl R. Fellers as members of this Committee for a term of three (3) years.

25. The Council in 1950 having neglected to elect three (3) members of the Babcock Award Committee and the President having made interim appointments of F. C. Blanck, Victor Conquest, and W. V. Cruess to the Committee, it was moved, seconded and carried that these appointees be elected for a term of three (3) years beginning June, 1950.

26. Reports of the various standing and special committees of the Institute were received by the Council and it was moved, seconded and carried that these be accepted and that copies of these reports be furnished the Editorial Board for publication of such material therefrom as may be of general interest to the membership.

27. There being no further business, the Council adjourned at 5:30 p.m.

CHARLES S. LAWRENCE
Executive Secretary

1951 ANNUAL BUSINESS MEETING OF THE IFT

The following are the proceedings of the Annual Business Meeting held at the Hotel New Yorker, June 20, 1951. President Paul F. Sharp, presiding, called the meeting to order at 1:15 p.m.

1. It was moved, seconded and carried that the minutes of the last year's meeting be approved as printed in FOOD TECHNOLOGY.

2. Mr. L. Atkin, Chairman of the Plant Trips arrangements, reported that the sale of tickets for plant trips had terminated at 12:00 noon and that three trips were sold out and the others were well filled.

3. The President brought out the fact that a charter had been granted to the Australian Section during the year and presented Mr. C. E. Norton of Australia, who expressed the thanks of the Australian Section for the granting of their charter and spoke of the relationship between the American technologist and those in that line of endeavor in Australia. Dr. J. R. Vickery, Chairman of the Australian Section is planning a trip to England and then to the States and will be able then to present the best wishes of the Australian Section.

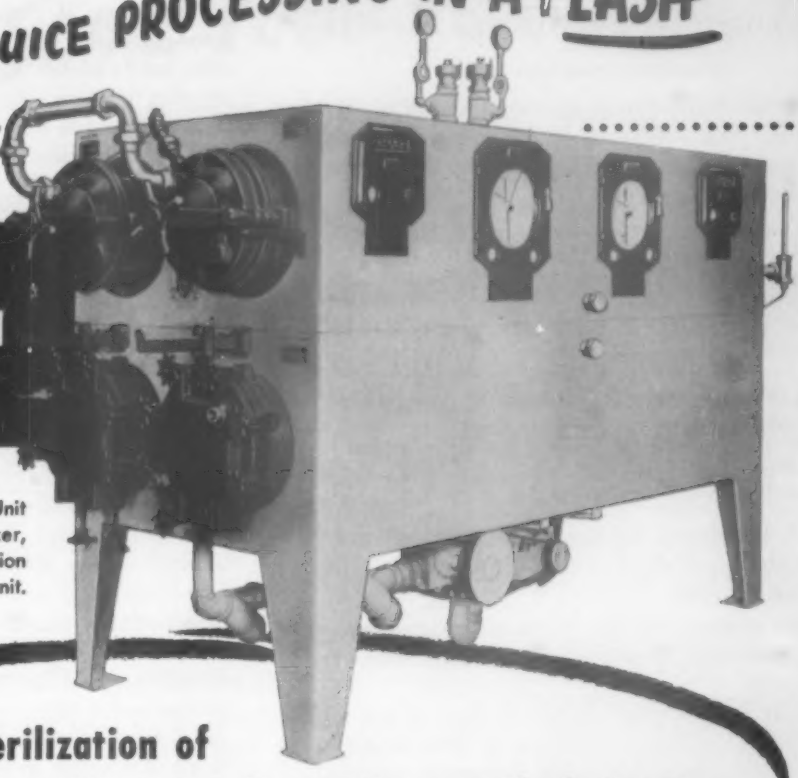
4. President Sharp read the telegram received from Dr. E. C. Chamberlayne, offering congratulations to the Institute on their 11th Annual Meeting and stating that the Canadian Institute of Food Technologists had recently been formed.

5. The President expressed the thanks of the Institute to the New York Section for the excellent work done in making this meeting a success. He expressed

(Continued on page 16)

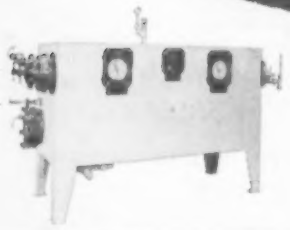
fmc JUICE PROCESSING IN A FLASH

- continuous operation
- compact, self-contained
- completely automatic

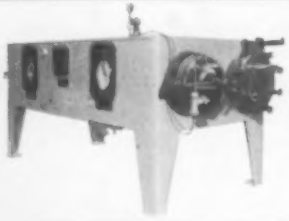


FMC Juice Processor, complete 4-Unit Type, includes Preheater, Pasteurizer, Holding Section and Cooling Section —all in one self-contained unit.

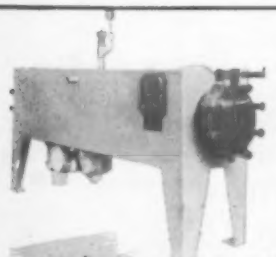
Complete sterilization of fruit and vegetable juices by continuous Flash Heating



FMC 3-Unit Juice Processor is comprised of Pasteurizer, Holding and Cooling Sections.



FMC Double Unit Juice Processor has self-contained Pasteurizer and Cooling Section.



FMC Single Unit Processor, used chiefly for citrus fruit juices, is the Preheater Section only.

Fruit and vegetable juices are completely sterilized in a matter of seconds by the flash processing method employed in the FMC 4-Unit Continuous Juice Processor. All elements of this compact unit are contained in a single sturdy frame, fully insulated for most economical operation. Contact parts are made of stainless steel, and are readily accessible for easy cleaning and maintenance. Operation is continuous and completely automatic, with the temperature of the heating and cooling sections closely controlled by flush mounted instruments which can be adjusted to meet requirements according to the particular product being handled. Flash processing, or pasteurizing, offers the advantages of thorough juice sterilization while making it possible to retain natural color and flavor of the product.

Write for full information, or call your nearest FMC representative

First in Diversified Food Equipment

fmc FOOD MACHINERY AND CHEMICAL CORPORATION TRADE MARK

FOOD MACHINERY AND CHEMICAL CORPORATION

Canning Machinery Divisions

General Sales Offices:

EASTERN: HOOPESTON, ILLINOIS **WESTERN:** SAN JOSE 6, CALIFORNIA

1951 Annual Business Meeting

(Continued from page 14)

a desire to honor those who had contributed so much of their time. The Chairmen of the following committees were requested to stand and receive the thanks of the Institute:

General Co-Chairmen: S. L. Galvin and J. H. Nair.
Banquet and Luncheons: R. T. Bohn.
Entertainment: A. Finberg.
Exhibits: R. C. Sherwood.
Finance: P. D. Kratz.
Hotel and Housing: I. D. Garard.
Ladies' Hospitality: Ruth R. Bien.
Meeting Arrangements: D. Melnick.
Plant Trips: L. Atkin.
Publicity and Printing: B. L. Oser and A. A. Schaal.
Registration: H. G. Beattie.
National Program Committee: C. N. Frey

6. Dr. Z. I. Kertesz, Editor, was introduced and extended the thanks of the Institute for the high editorial standards maintained.

7. In the absence of the Executive Secretary, the Treasurer presented the Secretary's and Treasurer's annual reports.

The question was raised as to whether or not all of our funds in the bank were covered by Federal Deposit Insurance. (Institute funds are presently carried in two accounts—a General Account and an Operating Account with the First National Bank of Chicago. These accounts are covered to the extent of $10,000.00 each. The Finance Committee is presently considering establishing an additional account in order to increase the insurance coverage to approximately the amount of the Institute balances.)

8. During President Sharp's term of office, three charters have been granted—the Australian Regional Section, Indianapolis Section, and now the Pittsburgh Section. The President then presented the Pittsburgh Charter to Dr. H. H. Mottern and asked the members from the Pittsburgh Section to stand.

9. A Resolutions Committee of which Dr. B. E. Proctor is Chairman, presented the following resolution:

> "WHEREAS, it is recognized that many individuals and organizations have contributed to the success of the 11th Annual Meeting and whereas the membership of the Institute are desirous of recognizing the valuable contributions of these persons and organizations; now, therefore,
>
> BE IT RESOLVED, That the Institute of Food Technologists express its sincere appreciation and gratitude for the fine services rendered by these individuals and organizations."

The resolution was adopted by unanimous vote.

10. Dr. John H. Nair moved that the Institute recognize the fine services of the President, Dr. Paul F. Sharp, and the fine growth the Institute has had this year under his leadership by giving him a rising vote of thanks. This was done.

11. Dr. Sharp turned the meeting over to Dr. Frey, saying: "I now transfer this gavel, thereby converting from President to Past-President, and converting the President-Elect to President. It is with great pleasure that I turn the gavel over to Charlie Frey."

Dr. Frey: "I greatly appreciate the honor bestowed upon me and I wish to express my appreciation to those who have assisted me in the preparation of the program for this meeting. Next year we hope will bring an even better program than this year and hope to see you all in Grand Rapids. God speed and a pleasant journey home."

12. The meeting adjourned at 2:00 p.m.

CHARLES S. LAWRENCE,
Executive Secretary

News of the Institute

(Continued from page 8 preceding technical papers)

joined in 1926, has been appointed senior scientist with the National Dairy Research Laboratories, Inc., Oakdale, Long Island, New York. He will act as a scientific adviser on the staff of Dr. Arnold H. Johnson, Vice-President and Director of Research. Dr. Webb received the Borden Award in 1943 for his work in the field of dairy technology. He co-authored the book, "By-Products of Milk," with Dr. E. O. Whittier, and is a recognized authority in the field of dairy research. He did his undergraduate work at California with graduate work at George Washington University and Cornell.

CHARLES H. BROKAW, of the Minute Maid Corporation of Plymouth, Florida, has been promoted to the position of Chief of Quality Control.

"TABLE OF FOOD COMPOSTION FOR THE ARMED FORCES" PUBLISHED

This up-to-date publication has been prepared by nutrition specialists in the Bureau of Human Nutrition and Home Economics of the U. S. Department of Agriculture at the request of the Quartermaster General.

The pamphlet contains the most exact information now available as to amount of vitamins and other nutrients in ration items and provides a reference aid for diet planners and others responsible for keeping armed forces of the United States well fed.

Starting with a limited table of food values used by the armed forces in World War Two the nutritionists constructed a new table, using unpublished analyses from the Quartermaster Food and Container Institute and the Bureau's collection of food composition data from research laboratories throughout the world.

The table shows nutrients to be expected from about 800 items, including some special products as canned spreads for bread, powdered dehydrated apricots, crackers with fortified yeast. Quantities of 11 different nutrients in one pound of each food item are given.

Foods in the table are arranged in the 16 groups regularly used by the armed forces in their meal planning. For some items, specification numbers and dates are cited.

The new reference table may be obtained from the Superintendent of Documents, Washington, D. C., for 30 cents a copy.

SOME FOOD FOR THOUGHT

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ANHEUSER-BUSCH MAINTAINS A TECHNICAL LIBRARY OF 5200 VOLUMES, ISSUES OF 225 TECHNICAL JOURNALS, AND AN ACTIVE PATENT FILE OF ABOUT 10,000 PATENTS AND 10,000 REPRINTS. ARTICLES IN 6 FOREIGN LANGUAGES ARE TRANSLATED BY ITS STAFF.

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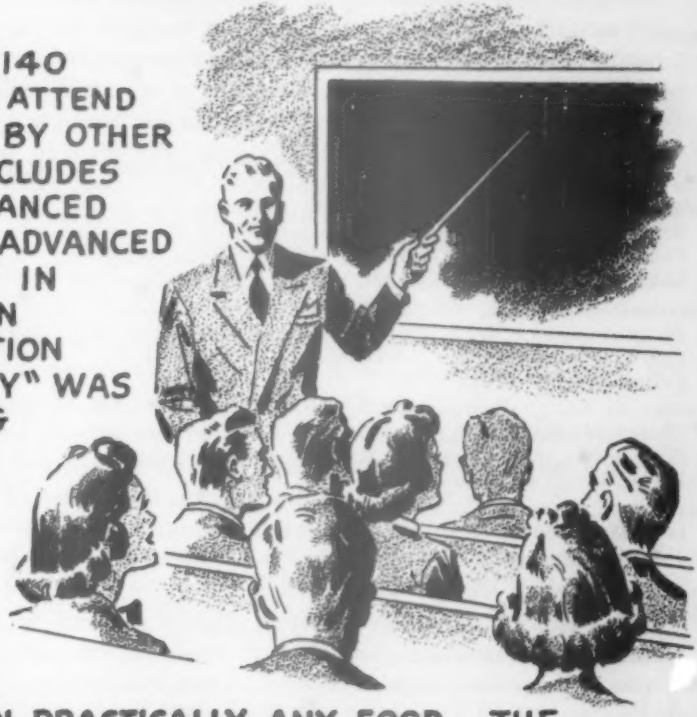

TODAY'S BABY HAS A MUCH MORE NUTRITIVE DIET. DRIED YEAST... IN PRACTICALLY ALL BABY CEREALS AND MANY BABY AND JUNIOR FOODS... IS A SUPPLIER OF NECESSARY NUTRIENTS.

IN PRACTICALLY <u>ANY</u> FOOD...THE ADDITION OF EVEN 1% OF DRIED YEAST WILL INCREASE THE NUTRITIONAL VALUE OF THE FOOD IN AN <u>ASTOUNDING</u> DEGREE. FOR THIS BOOKLET COMPARING DRIED YEAST'S NUTRITIONAL EFFICIENCY WITH OTHER FOODS... WRITE TO DRIED YEAST AND DERIVATIVES DEPT., ANHEUSER-BUSCH, INC., ST. LOUIS 18, MO.

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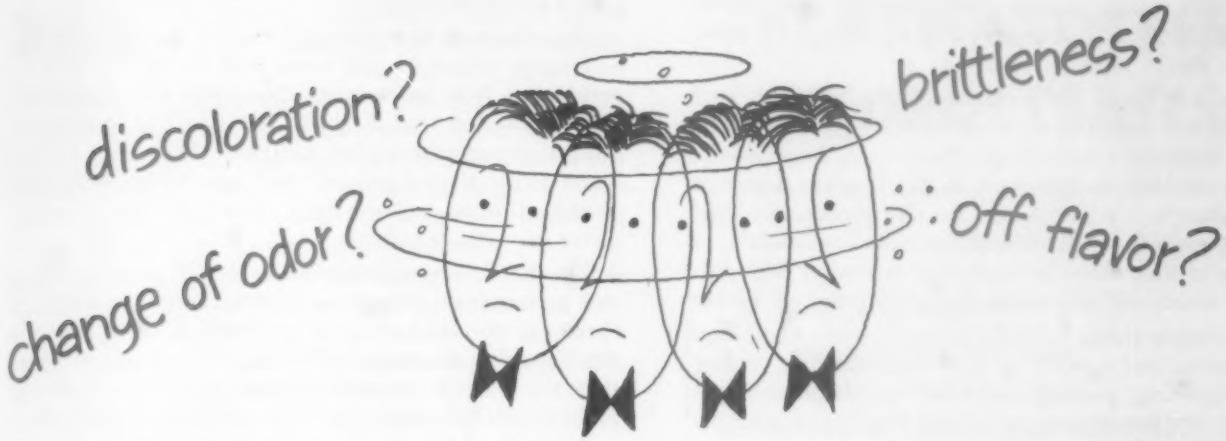

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Book Review

JAM MANUFACTURE. By George H. Rauch. 181 pages, with many illustrations, diagrams and tables. Leonard Hill Ltd., London, 1950. Price 1£ (about $3.80 in the U. S. A.).

There are many excellent books dealing with fruit products and touching upon the art of jam making, but to the reviewer's knowledge this is the only volume entirely devoted to this topic in the English language. Unfortunately for the American jam maker, the book is predominantly about British methods of manufacture. In spite of this, there is much information in this small volume which will benefit the American preserve maker.

The chapters deal with the factory; fruit; pectin and jelly formation; control of jam manufacture; cooling, filling, labeling, packing and handling; failures in jam making; the factory laboratory and analysis of jam; and recipes, formulas, etc. The Appendix contains many useful tables and an interesting discussion of legal regulations in various countries. An index of (British) suppliers and a subject index follow.

References to specific articles and other books touching on jam making are few and poorly quoted. Many journal references do not give the volume number, book references do not give the publisher and the year of publication. Of the large number of patents dealing with the subject apparently none are quoted. The illustrations are well selected and interesting, although many of them show antiquated methods of manufacture and equipment.

Yet, in spite of these limitations, reading this book will benefit the U. S. manufacturer of jams since discussions dealing with the whole sequence of steps in jam manufacture are so painfully lacking. For this reason the brief chapters on requirements for the factory, points of consideration in selecting fruit, the discussions of control in jam manufacture and of the reasons of failures in jam making will be of interest. The U. S. manufacturer will read with some satisfaction our federal regulations and will have to come to the inevitable conclusion that these (together with the collective action of preservers) must be to a large measure responsible for the high average quality of American jams and preserves.

Z. I. KERTESZ.

A CHECK LIST OF BOOKS AND PAMPHLETS ON GRAPES AND WINE AND RELATED SUBJECTS, 1938-1948. By Maynard A. Amerine and Louise B. Wheeler. 240 pages. University of California Press, Berkeley and Los Angeles, 1951. Price $5.00.

The field of grapes and wines is known to many of us for its extremely scattered literature. The bulk of publications on these subjects appear in foreign languages and in inaccessible publications, and therefore many workers in English-speaking countries have difficulty finding the newly published material and making use of it in their work.

The authors of this small volume have collected all references to articles, bulletins and books which appeared during the period 1938-1948. They have used all domestic sources of information as well as a number of key sources in foreign countries. The list of 1789 references for the period indicates how active investigators are in this field.

Viticulturists, enologists and those concerned with the technology of grapes and wines will find this volume of great use. It is unfortunate that many titles have not been translated into English and that the statements indicating contents are far too brief. Thus, any worker interested in the subject still will have to make his own investigation to decide whether the reference is of any direct importance to him.

The book is atractively printed and well organized and it contains a subject and author index as well as a listing of the references by countries of origin and a Bibliography of source material. This reviewer hopes that the success of this volume will encourage the authors and the publishers to continue this undertaking and that they will find it possible to give some more information concerning the contents of the publications listed by the use of text, symbols, numbers or otherwise. The compilation of this volume was an important service to those interested in the science and technology of grapes and wines.

Z. I. KERTESZ.

WORLD COCOA PRODUCTION AND CONSUMPTION IN 1950-51

World production of cocoa during the 1950/51 crop year (1 October 1950-30 September 1951, except for Brazil whose crop year is 1 May-30 April) is estimated at 768,000 metric tons. This appears to be a conservative estimate on the basis of crop reports up to the middle of January. The final outturn may range between 770,000 and 780,000 metric tons.

A cocoa crop of 768,000 tons would be about 20,000 tons below the record of 789,000 tons in 1949/50, it would be about 5,000 tons higher than the prewar years.

The significance of production figures can be evaluated, of course, only in the light of consumption data. In 1949/50 the world consumed not only the whole record crop, but some stocks carried over (both in importing and exporting countries) from the previous year. It is also necessary to evaluate the effects on consumption of the substantial rise in the price of cocoa beans which has taken place since the bulk of the 1949/50 crop moved to market. While the average price of Accra was 24.3 cents on the New York market between October 1949 and April 1950 (22.8 cents for Bahia), between October 1950 and January 1951 the average was about 36.3 cents.

The chief area of uncertainty in the production outlook lies in Brazil. In this study, total Brazilian production is estimated at 140,000 tons (16,000 tons below the record crop of 1949/50). This figure is based on the latest report of the Brazilian Ministry of Industry and Commerce, which estimate compares with the very conservative preliminary estimate of only slightly more than 100,000 tons for Bahia made before the end of last year by the Bahia Cocoa Trade Commission. (From FAO Commodity Reports, *Cocoa*, March 21, 1951.)

NATION'S DEFENSE DEPENDENCE UPON IMPORTS GROWING

As mobilization for defense moves into high gear, the United States' dependence upon its imports grows proportionately, the Office of International Trade reports.

Coffee, cork, tobacco, rubber, ores, drugs, tanning materials, and hundreds of other items from abroad have long been essential to our civilian economy. Production of the American hot dog requires 36 imported materials. More than 100 foreign commodities are used in the manufacture of the average automobile.

Production for defense places even greater demands on imports. Modern bombers and fighter-planes contain nearly 300 foreign-produced materials from 55 countries. Approximately 50 imported items go into front-line communications equipment.

United States imports during 1950 total $8,800,000,000. Copper from Chile, Canada, Mexico, and Northern Rhodesia accounted for $235 million; aluminum (metal and scrap) from Canada, $62½ million; natural rubber from British Malaya and Indonesia, $458 million; raw wool and related hair from Australia, Russia (13.2 percent of amount imported), Cuba, and Switzerland, $427 million; newsprint from Canada, $452 million; tin from British Malaya, Bolivia, Indonesia, and other sources, $202 million; burlaps from India, $90 million; nickel from Canada nearly $77 million; oils from Scandinavian and South American countries, Great Britain, China, the Philippines, and other sources, about $162 million.

Coffee—considered by many as essential to defense—remains our largest dollar value import. Brazil and Columbia shipped the United States more than one billion dollars' worth last year.

About one-third of our imports come from the Latin American republics which furnished the United States with more than three-fourths of its foreign-produced supplies of such essential materials as bismuth, castor beans and oil, iodine, ipecac, quebracho extract and vanadium ore.

Latin America also supplied more than half the United States' imports of antimony, beryl, copper, fluorspar, lead, and zinc ore. (From Defense Production Record, 1 (6) 4, June 7, 1951.)

SOURCE MATERIAL BULLETIN ON TOMATOES PUBLISHED BY THE U. S. D. A.

A new and different reference bulletin entitled "Tomatoes—Facts for Consumer Education," by Irene Wolgamot, of the Bureau of Human Nutrition and Home Economics, U. S. Department of Agriculture has been published.

The bulletin brings together source material on such topics as quantities of tomatoes used; nutritive value; seasonal supplies and sources; retail price trends and price comparisons with other foods; marketing operations and costs; selection; use in family meals. Recipes are suggested merely by name, with references cited.

The bulletin may be purchased from the Superintendent of Documents, Washington 25, D. C. at 10 cents a copy (coin not stamps).

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Selected Abstracts

ANALYTICAL METHODS

The determination of fat and sugar in chocolate.

Wood, E. E. *Can. J. Technol., 29,* 66-70 (1951).

Methods for the estimation of the total fat and total sugar content of chocolate are briefly reviewed and compared. Detailed procedures for the rapid determination of both constituents from a single sample are presented. In principle, these are based upon rapid extraction of the fat with solvent and separation of the extract by centrifuging. The defatted residue is combined with a definite proportion of water and the sugar content of the liquid measured by the refractometer.

Estimation of coconut oil in presence of mineral oils and other vegetable oils.

Iyer, S. N. *J. sci. industr. Res. India, 9,* 93-5 (1950); *Brit. Abst., C. 11,* No. 77 (1951).

Determination of Reichert and Polenske values gives reasonably quantitative indication of adulteration of coconut oil with vegetable oils such as peanut oil. When mineral oil is present, it is necessary to leave the oil with the glycerol soda overnight before heating and to heat for 4 minutes after the solution clears. Results can be obtained from a graph of synthetic mixtures.

The Fiske-Subbarow method for determining phosphate with special reference to soil extracts.

Yuen, S. H. and Pollard, A. G. *J. Sci. Food Agric., 2,* 36-42 (1951).

Modifications of the Fiske-Subbarow method are described by which susceptibility to interference by silicate, arsenate, and certain acids and salts was reduced. In view of the possibility that some soils may contain considerable amounts of extractable arsenate and ferric iron, a method for eliminating interference by these two ions, by reduction with metabisulphite, is described. By this procedure, arsenate and ferric iron up to 20 p.p.m. As_2O_5 and 80 p.p.m. Fe had no effects on the determination. The applicability of the modified technic to the determination of phosphate in soil extracts and in plant ashes is examined.

Improved procedure for cleaning glassware used in determining the stability of fats and oils by the active oxygen method.

Fore, S. P., Moore, R. N., and Bickford, W. G. *J. Am. Oil Chemists' Soc., 28,* 73-4 (1951).

Glassware cleaned with a synthetic detergent instead of hot or cold chromic-sulfuric acid leads to improved reproducibility of the stability of fats and oils determined by the active oxygen method. When the glassware used in this method is cleaned with hot chromic-sulfuric acid, chromium compounds are absorbed within the glass walls and subsequently diffuse into the oil or fat leading to erratic results. A method is described for cleaning the glassware used with the fat stability method which has given reliable results in the hands of the authors for more than a year, during which it has been in almost daily use.

BIOLOGICAL SCIENCES

BIOCHEMISTRY

Some factors affecting the antioxidant behavior of ascorbic acid with unsaturated fats.

Watts, B. M. and Wong, R. *Arch. Biochem. 30,* 110-20 (1951).

Addition of small increments of tocopherol to lard in contact with solutions containing ascorbic acid and hemoglobin brought about relatively large increases in the protective factor obtained with ascorbic acid. At a temperature of 5° C. the rate of oxidation of pure oleic acid in contact with buffer solutions was almost as rapid as that of linoleic or linolenic acids. Both hemoglobin and ascorbic acid catalyzed the oxidation of linoleic and linolenic acids, but not of oleic acid. Salts of ethylenediaminetetraacetic acid (Versene) acted as effective antioxidants in aqueous fat systems at a temperature of 45°. Versene alone was not effective in fat oxidations catalyzed by hemoglobin. It did not eliminate the catalytic effect of copper or iron on fat oxidation. The addition of Versene to ascorbic acid solutions eliminated any prooxidant effect of the ascorbic acid. The combination had strong antioxidant properties with natural fats and pure fatty acids under all conditions of temperature, pH, and tocopherol and hemoglobin levels tried. The Versene did not act by protecting reduced ascorbic acid, although it did eliminate the catalytic effect of added copper on ascorbic acid oxidation.

"Tween 20" and fecal fat in premature infants.

Johnson, A. L., Scott, R. B., and Newman, L. H. *Am. J. Dis. Children, 80,* 545-50 (1950); *Am. J. Digestive Diseases 18,* 103 (1951).

A study of 13 premature and 2 full term infants with steatorrhea. Six of the prematures failed to show increase in fat retention and seven showed a slight increase during administration of "Tween 20". "Tween 20" was no more effective in reducing fecal fat than skim milk alone and is apparently non-toxic.

BOTANY

Scabrin—a new botanical insecticide.

Roark, R. C. *Soap & Sanit. Chemicals, 27,* 125, Mar., 1951. Scabrin has been isolated from the roots, stems, and leaves of the American weed *Heliopsis scabra Dunal.* Although the structure of this compound is as yet undetermined, it occurs in the dry plant to the extent of about 0.2% as a viscous yellow oil. Preliminary laboratory tests find it to be 2.5 times as toxic as the pyrethrins to house flies and its effectiveness against other insect pests is being determined. As an antibiotic it was found to inhibit the growth of the fungus *Fusarium oxysporum* and both gram-positive and gram-negative bacteria. It appears to be toxic to warm blooded animals.

Hormones from tomatoes.

Fontaine, T., Sato, Y., and Mosettig, E. *Science N. L., 59,* 147 (1951).

Tomatidine, the non-sugar portion of tomatin, an antibiotic, found in the roots and leaves of tomato plants can be converted into allopregnenolone, which in turn is transformed into progesterone, and testosterone. Attempts are now being made to convert tomatidine into cortisone.

NUTRITION

Factors affecting the utilization of food by dairy cows. I. The rate of passage of food through the digestive tract.

Balch, C. C. *Brit. J. Nutr., 4,* 361-88 (1950).

Existing technics were elaborated to give a method of measuring the rate of passage of undigested food residues in cows. The method consisted of feeding a small meal of stained food and counting the stained particles in subsequent voidings of faeces. The principal marked food was hay. The amounts of faeces voided were used to determine the per cent of the total stained particles that had been excreted at any given time after feeding, and the data were used to plot excretion curves. In five experiments with dairy cows, excretion curves for hay were characterized by an initial appearance of marker in the faeces varying from 12 to 24 hours after feeding, a slow excretion of the first 10% of the residues followed by a higher rate of excretion typically resulting in the passage of 80% of the residues within 70-90 hours. Excretion then proceeded more slowly and was completed 7-10 days after feeding.

The protein quality of oats.

Heathcote, J. G. *Brit. J. Nutr., 4,* 145-54 (1950).

An extensive survey of the nitrogen distribution within the oat grain has been made using chiefly microbiological methods. No gross varietal differences in the composition of oat protein have been detected. Over 85% of the total nitrogen of the oat grain can be accounted for in terms of amide- and amino-acid-nitrogen. The significance of this finding with reference to the nitrogen conversion factor for oat protein is discussed.

The effect of heat treatment on the nutritional value of some vegetable oils.

CRAMPTON, E. W., FARMER, F. A., AND BERRYHILL, F. M. *J. Nutr., 43,* 431-40 (1951).

Ingestion of certain oils heat-polymerized at 275° C. depress rat growth and the efficiency of feed utilization. This reflects a lowered nutritive value of those oils which vary in severity with the degree of unsaturation of the oil, the length of time of heating each oil, and the level at which the heated oil is incorporated in the diet. The factor or factors responsible for these adverse nutritional effects appear to be present in the oil itself and act in a manner directly toxic to the animal.

Nitrogen-balance studies on rice diets.

CULLUMBINE, H. *Brit. J. Nutr., 4,* 129-33 (1950).

Each student consumed daily in a mixed died 9 ounces rice, and the type of rice was varied. The "apparent" digestibility of the rice proteins was greater for polished rice than for unpolished rice. It is easier to maintain a nitrogen balance on a polished rice diet than on an unpolished rice diet.

The effect of some combinations of human foods on the growth and health of the laboratory rat.

CALLISON, E. C., ORENT-KEILES, E., AND MAKOWER, R. U. *J. Nutr., 43,* 131-52 (1951).

Five diets were studied and a commercial ration used in the rat breeding colony was fed as a standard of reference. The data indicate that the over-all nutritive value of human-type diets for human beings cannot be assessed by their effect on rats without careful evaluation. It is suggested that this evaluation should take into account (1) the differences in anatomy and physiology between the two species; (2) the equivalent physiological ages of the experimental rats and human beings; (3) the comparative dietary requirements of each species; and (4) the degenerative diseases which are analogous in the two species, and, though not identical, may be produced by the same fundamental dietary pattern.

ENGINEERING

Principles of spray drying. Part II. Elements of spray-dryer design.

MARSHALL, W. R., JR., AND SELTZER, E. *Chem. Eng. Progress, 46,* 575-84 (1950).

A procedure is set up for the design and selection of spray drying equipment. The most important operating variables-nature of the product, method of atomization, feed concentration, drying temperature, need for cooling with secondary air, method of product removal, and dust recovery and their effect on the physical properties of the dried product, are discussed in detail. Various types of spray dryers and the operating features they employ, are discussed, and operating cost data are compared with such variables as evaporation rate and drying temperature.

FOOD PRODUCTS

The flavor problem of soybean oil. IX. Organoleptic identification and probability analysis.

EVANS, C. D., LANCASTER, E. B., DUTTON, H. J., AND MOSER, H. A. *J. Am. Oil Chemists' Soc., 28,* 118-21 (1951).

In the evaluation or identification of an edible oil it is shown how the probabilities of chance selection for a single taster are dependent upon the manner in which the samples are presented. The probabilities of 1/2, 1/3, 1/4, 1/6, and 1/8 are all possible, depending upon the method of sample presentation, i.e., as pairs, multiple pairs, odd sample tests, or other combinations. The expansion of the binomial expression for the probabilities of success and failure for a single taster make it possible to calculate the compound probabilities for taste panels up to 20 members. By knowing the compound probabilities, significance at any level can be easily calculated. Tables showing the number of errors permissible have been calculated for the significant levels of 1% and 5% for panels of 1 to 15 members. Application and use of the tables, based on data obtained in the identification of simulated soybean oil by a taste panel of 10 members, are presented and the data discussed.

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14-100

Abstracts

Chemical additives in foods.

LONGNECKER, H. E. *J. Am. Dietet. Assn., 27,* 185-9 (1951).

A history of the work of the Food and Nutrition Board is given. The Committee on Food Protection, the Congressional Committee for studying safety of foods and work and advisors of the Committee on Food Protection of the National Research Council are included.

The role of microorganisms and storage temperatures on the quality of orange concentrates.

PATRICK, R. *Proc. Florida State Hort. Soc., 62,* 174-7 (1949); *Biol. Abst., 25,* 419, No. 4446 (1951).

The storage of orange concentrate at 0° F. for 198 days did not insure the complete destruction of spoilage organisms. However, the spoilage organism count was reduced to a very low level in samples studied. Certain yeasts will grow in orange concentrate stored at 42° F. and produce spoilage. Yeasts are the principal surviving organisms in concentrate stored at 42 and 0° F. Enzyme activity continued in samples of concentrate stored at 42° F.

Gel formation in frozen citrus concentrates thawed and stored at 40° F.

ROUSE, A. H. *Proc. Florida State Hort. Soc., 62,* 170-4 (1949); *Biol. Abst., 25,* 419, No. 4447 (1951).

In establishing the cause of gelation in unpasteurized citrus concentrates stored at 40° F. data were secured in reference to the relationship between the degree of gelation and methoxyl content of the pectin, pectase activity and rate of separation of reconstituted citrus concentrates. As the storage time was increased, the methoxyl content of the pectin decreased and gelation usually increased unless the pH was too high. A greater degree of gelation was found in those concentrates having the higher pectase activity. The maximum pectase activity found in the samples of frozen citrus concentrates was 0.2 units for tangerine, 5.0 for grapefruit, and 7.3 for orange. As gel formation appeared and increased with storage, the rate of separation increased. Those samples which showed no gelation or only slight gelation retained a colloidal cloud after the pulp separated.

Navel orange juice bitterness.

MARSH, G. L. AND CAMERON, S. H. *California Agric., 4,* 7 (1950); *Biol. Abst., 25,* 953, No. 10227 (1951).

The Washington Navel orange as grown in California is not suited for conversion to juice products on a commercial scale. The extracted juice turns bitter and becomes unpalatable. Apparently, a nonbitter precursor present in the fruit produces the bitter substance in the extracted juice. Precursor is probably present in immature fruits of the Washington Navel orange when grown on a rootstock; it disappears as the fruit matures. Kind of rootstock affects the rate of precursor disappearance. At commercial maturity the nonbitter precursor has nearly or completely disappeared from fruit grown on grapefruit rootstock. Within a few weeks it has likewise disappeared from fruit grown on trifoliate orange and sweet orange rootstocks. It disappears late in the season from fruit grown on sour orange and navel cutting trees. It never disappears completely from fruit grown on rough lemon rootstock.

Estimation of sterilizing values of processes as applied to canned foods.

GILLESPY, T. G. *J. Sci. Food Agric., 2,* 107-25 (1951).

The F value of a heating process as applied to a can of food is defined as the time in minutes at 250° F., assuming the whole can to be raised instantaneously to this temperature and cooled instantaneously to a sub-lethal temperature afterwards, that would give the same degree of sterility as the process to be valued. The implications of the term "degree of sterility" are discussed.

Process of manufacturing dry starch preparations soluble in cold water.

HOOGEZAND, J. L. AND VAN DER MEER, W. A. *Assignors to Maamlooze Vennootschap. 2,542,932,* Feb. 20, 1951.

A dry stable starch preparation soluble in cold water to a solution which when dried on the surface of a material in the presence of an acid catalyst for the condensation will produce insoluble films, the preparation comprising a mixture of a precondensate of formaldehyde and a substance taken from the group consisting of urea, thiourea, phenol and cresol, and a hydroxy alkyl ether of cold swelling starch in which the starch molecule is degraded by the alkaline treatment required for the ether preparation, it being degraded to such an extent that when dissolved in cold water it produces a perfectly smooth, viscous, structureless paste, the components of mixture being present in the form of discrete, separate particles.

PHYSICAL RESEARCH

Surface films and particle size determination of powders.

GRAY, V. R. *Can. J. Research, 28B,* 277-91 (1950).

It has been found possible to spread almost any powder on a water surface in a layer one particle thick and to study its surface pressure-area relation by conventional film balance technics. A special sprinkler was developed for placing the powder on the surface, and flotation agents were absorbed on particles which do not normally float. Fine particles needed extended outgassing and drying before they were sufficiently deflocculated. Although all films collapsed more or less readily on compression, it was possible to define a point in the compression curve which represented a rigid film. The thickness of this film was a definite fraction of the mean particle diameter, measured by microscopic methods, the fraction varying with ease of agglomeration and with the shape of the particles. This method can be used for measurement of mean particle size and it possesses certain advantages over existing methods for many purposes.

The molecular magnitude of amylopectin.

KERR, R. W., CLEVELAND, F. C., AND KATZBECK, W. J. *J. Am. Chem. Soc., 73,* 111-17 (1951).

Osmotic pressures of corn amylopectin acetate in chloroform indicate a Dp_n of the order of 1400-1500, compared to a value 1800 previously estimated by means of enzymic hydrolysis. Tapioca amylopectin was found to have a DP_n of 1300-1400 and a chloroform soluble potato amylopectin acetate could not be prepared. Whole corn starch was found to have a DP_n of 1000 by osmometry consistent with the view that it is composed of one part amylose of DP_n 500 and 3 parts amylopectin of DP_n 1500.

PATENTS (U.S.A.)

APPARATUS

Apparatus for feeding material at a predetermined rate.

HARKENRIDER, R. J. Assignor to Allied Chemi al & Dye Corp. 2,544,155, Mar. 6, 1951.

Apparatus for continuously discharging a predetermined amount of material from a hopper at a predetermined rate comprising a hopper, a discharge outlet for hopper, a valve for outlet adaptable to regulate the actual rate of discharge of material from hopper, an indicator operable in accordance with the amount of material in hopper and movable over a graduated course to constantly denote the actual amount of material in hopper, a rate timer, means for moving timer at a rate proportional to desired predetermined rate of discharge of material from hopper, indicator and timer being constructed and arranged so as to move constantly in-step when valve functions to effect discharge of material from the hopper at predetermined rate, means actuated by any out-of-step relation of indicator and timer for regulating valve to alter the actual rate of discharge of material from hopper sufficiently to restore indicator and timer to in-step relation, means actuated by the indicator at the end of its material discharge travel over course to feed material to hopper, and means actuated by the indicator on its return over course to stop feeding means.

CAFFEINE AND COFFEE

Process for the production of caffeine.

COMTE, F. Assignor to Monsanto Chemical Co. 2,542,396, Feb. 20, 1951.

The process for the production of caffeine, comprising the addition with agitation of dimethyl sulfate to an aqueous me-

dium containing a substituted uracil selected from the group consisting of 4-amino-5-formamido uracil and its alkali metal salts, in the ratio of at least 2 molecular proportions of the dimethyl sulfate per molecular proportion of the selected substituted uracil, while adding an aqueous alkaline solution, so as to maintain the reaction mixture at a pH within the range of from about 9.0 to 10.0 and a temperature in the range of from about 20° to 50° C., thereby obtaining a first reaction mixture containing 1,3-dimethyl-4-amino-5-formamido uracil, heating first reaction mixture to a temperature in the range of from about 70° to about 95° C., while maintaining the pH in excess of about 10.5 by the addition of an alkali metal hydroxide in the ratio of approximately 1 molecular proportion of the alkali metal hydroxide per molecular proportion of the selected substituted uracil, thereby obtaining a second reaction mixture containing the alkali metal salt of theophylline, adding dimethyl sulfate to the second reaction mixture in the ratio of at least 1 molecular proportion of dimethyl sulfate per 1 molecular proportion of the selected substituted uracil, while adding an aqueous alkaline solution so as to maintain the reaction mixture at a pH in the range of from about 8.0 to 10.5 and while maintaining a temperature in the range of from about 20° to 70° C., and recovering therefrom substantially pure caffeine.

Separation of coffee aroma.

COLE, H. M. Assignor to General Foods Corp. 2,542,119, Feb. 20, 1951.

A process of preparing a defatted, dry soluble coffee product containing aromatic constituents of roasted coffee with their characteristic flavor and aroma substantially unaltered which comprises extracting ground roasted coffee with a volatile organic solvent and distilling solvent to provide a residue containing aromatic constituents combined with coffee fat, preparing an aqueous infusion of the defatted and dearomatized coffee and drying the infusion to provide a dry soluble coffee product, separating aromatic constituents from fat by distilling residue under reduced pressure, and collecting and incorporating the separated aromatic constituents in product.

ENRICHMENT

Method of increasing the riboflavin content of liquid biologically active or nutritive materials.

DE BECZE, G. I., MOORE, H. N., AND SCHRAFFENBERGER, E. Assignors to Schenley Industries, Inc. 2,543,897, Mar. 6, 1951.

A method of treating distillers' stillage to increase its content of B-vitamins, by means of the organism *Eremothecium ashbyii*, which consists in supplementing stillage with inorganic nitrogen and phosphorus nutrient and with carbohydrate nutrient for organism, adjusting the pH of supplemented stillage to substantially 5-6, sterilizing supplemented and adjusted stillage, inoculating sterilized supplemented and adjusted stillage with organism, and propagating organism in sterilized supplemented and adjusted stillage at a temperature of substantially 29° C.-32° C. while agitating and aerating sterilized supplemented and adjusted stillage, the inoculum of organism being a culture of organism which has been propagated in supplemented and adjusted sterile stillage under aeration and agitation and which is intermixed with supplemented and adjusted stillage.

FREEZING

Frozen confections.

BURT, L. H. Assignor to Hercules Powder Co. 2,548,865, Apr. 17, 1951.

A frozen confection composition comprising confection ingredients, a water-colloidable carboxyalkyl carbohydrate and water, carboxyalkyl carbohydrate being present in an amount between about 0.01% and about 0.5% by weight, composition being characterized by a reduction in whipping time to produce the desired overrun during manufacture into a frozen confection and possessing improved body and texture properties as a frozen confection.

Quick-freezing machine.

BURNEY, C. D. Assignor to Fresh Frozen Foods Limited. 2,543,889, Mar. 6, 1951.

In a freezing apparatus, in combination, an exterior insulating frame; a freezing compartment formed in frame; a plurality

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Abstracts

of superimposed vertically spaced, substantially horizontal shelves mounted in freezing compartment for supporting the trays thereon; the shelves having parallel tubular spaces formed therein; means for circulating a refrigerant through tubular spaces; means for circulting a stream of air in a sinuous path along shelves so as to contact the same at their upper side and at their under side; and fins provided on at least the under side of shelves parallel to the current of air set up by circulating means.

FRUIT AND VEGETABLES

Extraction of citrus peel.

GRAHAM, R. P., AND SHEPHERD, A. D. Assignors to U. S. A. 2,548,895, Apr. 17, 1951.

A counter-current process for obtaining an extract having a pectic concentration of higher than about 0.3% and having a relatively high filtration rate, comprising slowly passing citrus peel, dried to at least about 90% solids and in the form of strips from about 1/16 inch to about 1/4 inch in width, through an elongated path in a body of dilute aqueous mineral acid with a minimum of disintegration of the peel, the peel and the aqueous acid moving in opposite directions, and removing the extract toward one end of the body and the peel toward the other.

Treatment of citrus fruit to facilitate peeling.

POLK, R., SR. AND POLK, R., JR. Assignors to The Polk Development Co. 2,543,932, Mar. 6, 1951.

A method of treating citrus fruit to facilitate removal of the peel therefrom comprising the steps of mutilating the outer peel layer to expose the albedo, and subsequently subjecting the fruit to heat at least the temperature of boiling water to wilt the albedo.

Method for sectionizing citrus fruits.

POLK, R., SR. AND POLK, R., JR. Assignors to The Polk Development Co. 2,549,333, Apr. 17, 1951.

A method of removing well defined bodies of membrane-free meat portions from citrus fruit comprising exposing the meat of the fruit segments at opposite poles of the fruit while leaving a continuous equatorial band of peel intact on the fruit, then severing completely well defined bodies of meat from the membranes defining the fruit segments, removing bodies from peel, and then rupturing the juice sacs remaining after removal of meat to extract juice from remaining juice sacs.

Dehydrated apples.

CALLAGHAN, R. W., AND BERGLUND, L. W. Assignors to General Mills, Inc. 2,541,859, Feb. 13, 1951.

Process of dehydrating apples which comprises preparing apple slices having a thickness within the range of 3/16 to 5/16 of an inch, air-drying the apple slices to a moisture content within the approximate range of 16-24% to produce evaporated apples, thereafter subjecting the evaporated apples without a resulfuring treatment and without substantial disintegration of the apple slices to air-drying.

Process for recovery of vegetable protein.

ROWE, S. Assignor, by mesne assignments, to Buckeye Cotton Oil Co. 2,549,526, Apr. 17, 1951.

In the process of recovering vegetable protein from an aqueous alkaline solution thereof, which process comprises acidifying the solution to precipitate the protein, and filtering off the precipitated protein, the improvement which comprises adding to the protein-containing liquor, at any time prior to filtration, a heavy metal containing inorganic salt substantially soluble in the alkaline solution of the protein but forming a gelatinous precipitate in the acid liquor in which the protein is precipitated, the pH of the protein-containing liquor being from about 3.6 to about 4.5 during filtration.

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Process of making corn meal porridge.
WALKER, C. J. 2,541,730, Feb. 13, 1951.

The process which comprises the steps of intermittently agitating corn meal in water below cooking temperature for agitating periods of approximately five minutes and allowing the meal to settle between agitating periods; drawing off the water between periods and continuing those periods until the water becomes clear; flowing the corn meal with a residual clear water content into a body of water at approximately 140° F. and holding that temperature for approximately five minutes; raising the temperature of body of water with the meal therein to approximately 212° F. and maintaining that temperature for approximately five minutes; and thereafter sealing the cooked wet meal in cans and continuing cooking under pressure for a length of time sufficient to sterilize the mass.

Method of preparing corn.
FITZPATRICK, W. J. Assignor to The W. J. Fitzpatrick Co. 2,544,380, Mar. 6, 1951.

The method of preparing corn comprising cutting substantially whole corn kernels from the cob, cleaning the kernels, adding liquid to the kernels, and slitting at least a portion of the kernels in the liquid.

PROCESSING

Apparatus for handling fish preparatory to canning.
SKOOG, P. F. 2,541,442, Feb. 13, 1951.

A machine for preparing fish for canning, consisting of an apron for conveying fish loins, a knife disposed above apron for slicing loins, spring urged presser foot on each side of knife, a spring urged seperating blade spaced from knife, a turret disposed in front of the discharge end of apron having a plurality of flat faces formed thereon, means operatively connected to turret for intermittently turning turret and stopping it when one of its flat faces is adjacent to and spaced from separator, an off-bearing conveyor disposed along the top of turret and a rake operatively associated with turret for transferring slices of the fish to off-bearing conveyor.

Sterilization of liquids.
TOLMAN, J. A. 2,540,223, Feb. 6, 1951.

A method of treating liquids to destroy bacteria suspended therein which comprises flowing the liquid while in contact with a solid porous current-conducting body providing a continuous electric path through which a direct electric current is passed and maintaining a very large area of inter-facial contact between the liquid and said body as compared with the volume of liquid under treatment at a given moment, the average density of said current being of the order of 1 milliampere per square inch.

Process for preserving mixed food.
ZIMMERMANN, S. J. Assignor to Internationale Aktiengesellschaft fur Gassynthesen. 2,549,743, Apr. 17, 1951.

A method of preparing preserved food stuffs comprising the steps of preparing ready meals from meat and vegetable materials and heating the ready meals together with added edible fatty substances to dehydrate the meals and to replace water originally contained therein by the fatty substances.

Process of making canned geletin.
WALKER, C. J. 2,541,731, Feb. 13, 1951.

The process of making a canned gelatin product which comprises, in using ingredients in proportions based upon a number two can size, placing substantially one inch of cold water in the can; three-eighths of an ounce of granulated gelatin in the can, and allowing the can and contents to stand for from two to three minutes; adding to the can, one dram of a mixture of flavor and color material, four grains of salt, three and one-half ounces of cane sugar, and fifty grains of an acid of the group consisting of tartaric and citric acids; filling the can with hot water at a minimum temperature of 212° F.; immediately sealing the can; heating the sealed can and contents for substantially ten minutes in a water bath at a minimum temperature of 212° F.; and then quickly cooling the sealed can and content for substantially ten minutes in a medium between freezing and room temperature.

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The pamphlet discusses the respective scopes of the two journals and the type of articles suitable for them. A detailed outline is presented of the customary organization of technical papers followed by statements concerning the preferred styles and methods of preparing manuscripts. A discussion of various details like units of measurements and their abbreviations, use of footnotes and literature citations, preparation of tables and figures, etc., follows.

In the following chapter the customary methods of correcting printer's proofs are described. Here a list is given indicating the more common corrections. Instructions for the ordering of reprints follow.

Prospective authors are urged to consult this pamphlet which will be sent free of charge upon a request addressed to the editorial office.

Authorship in Food Technology and Food Research is not restricted to members of the Institute of Food Technologists.

U. S. PER CAPUT CONSUMPTION OF CONFECTIONERY IN RELATION TO INCOME

The per caput consumption of confectionery in the United States rose from 14.7 lbs. in 1927 to 15.5 lbs. in 1937, and 17.3 lbs. in 1949. The all-time high was in 1944 with a per caput consumption of 20.7 lbs. However, during the same period the personal disposable income in the U. S. rose from $82,484,000 in 1929 to $187,444,000 in 1949 and the percentage of disposable income spent on confectionery varied only from a low of 0.414% in 1945 to a high of 0.519% in 1948. (Based on FAO Commodity Reports, *Cocoa*, March 21, 1951.)

REPORT ON U. S. PRODUCTION OF FRUIT SPREADS PUBLISHED

A report entitled "Fruit Spread Production in 1948 and 1949" issued by the U. S. Department of Commerce, supplies detailed information on United States production of preserves, jams, jellies, fruit butters, and marmalades. The survey was conducted under auspices of the Commerce Department and with financial sponsorship of the National Preservers Association. The statistics in the report were furnished by 182 manufacturers on questionnaires drawn to the specifications of the industry.

Estimated total fruit spread production in the United States in 1947, 1948, and 1949 was 671, 537, and 531 million pounds, respectively.

Copies of the detailed report are available from the Business Information Service, Office of Industry and Commerce, U. S. Department of Commerce, Washington 25, D. C., for 25 cents each.

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IMPORTANCE OF SWOLLEN SHOOT DISEASE OF COCOA TREES

The West African Cocoa Research Institute, established in 1944, has demonstrated that there are at least 20 different viruses responsible for swollen shoot. Some of these viruses are comparatively mild and take many years to kill a tree; the more virulent varieties, however, kill a tree in less than two years. It has also determined that the viruses responsible for swollen shoot were not introduced into Africa but were present in the forest all the time. Consequently, "as long as the reservoir of the virus remains in the forest, complete and permanent eradication of swollen shoot in West Africa cannot be expected." Unfortunately the only effective method discovered to date for destroying the virus is by destroying the tree and the alternative hosts on the farm.

The extent of the damage wrought by the swollen shoot viruses has been demonstrated on a number of experimental farms operated by WACRI. An untreated farm in which 31% of the trees were infested in 1945 had an infection rate of 88% (inclusive of trees killed by the disease) by 1949. On the other hand, where the original infection was slight, scientific control through the cutting out of infected trees reduced the tree population by only 7% over an 11-year period. As might be expected, control proved less effective in areas where the original infection was highest. On one 20-acre farm, which had an original infection of 39%, the tree population was further reduced by 36% over a period of five years. (From FAO Commodity Reports, *Cocoa*, March 21, 1951.)

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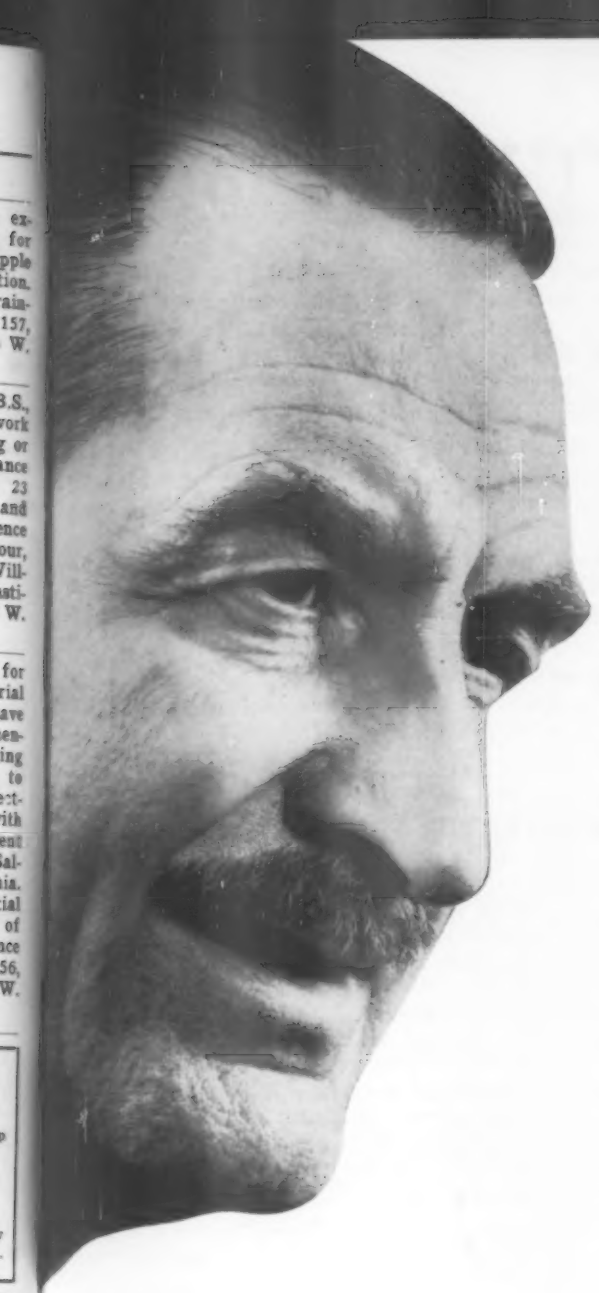

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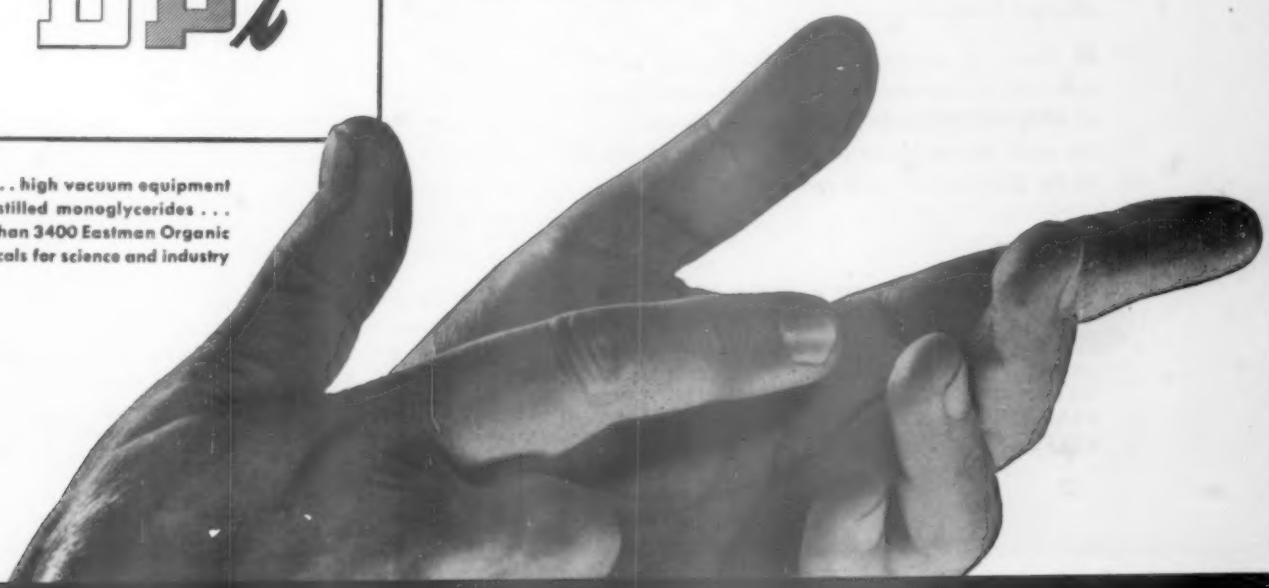

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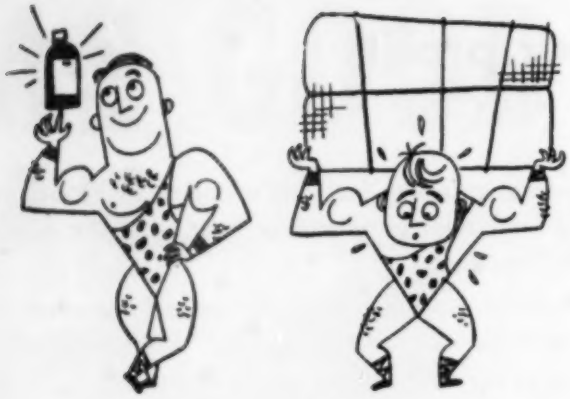

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REPORT ON INTERLINGUAL SCIENTIFIC DICTIONARIES

The cross-fertilization of ideas among the nations of the world—one of UNESCO's methods of promoting international unity is aided and abetted by a couple of its new publications, "Report on Interlingual Scientific Dictionaries" and its larger companion, "Bibliography of Interlingual Scientific Dictionaries." The "Bibliography" lists 1044 works and covers everything from clocks to coal mining, from jam to jet propulsions. If you're interested, say, in translating an article on watchmaking into French, you look in the "Subject Index for English for Watches," find its number (according to the Universal Decimal System classification), then find its corresponding number in the body of the work. There, on page 185 in this case are listed three dictionaries on watchmaking. The Bibliography is indexed under 45 languages and covers around 400 subjects.

The Report may be obtained for 25c and the Bibliography for 50c from the Columbia University Press, 260 Broadway, New York 27, N. Y.

FUTURE DATES FOR FOOD TECHNOLOGISTS

1951

Sept. 8-13	XIIth International Congress of Pure and Applied Chemistry. New York, N. Y.
Sept. 10-14	American Society of Horticultural Science, Annual Conference, University of Minnesota, St. Paul, Minn.
Sept. 26-29	International Association of Milk and Food Sanitarians. Glenwood Springs, Colo.
October	International Association of Ice Cream Manufacturers. Detroit, Mich.
October	International Canning Conference. Paris.
Oct. 1-3	Association of Official Agricultural Chemists. Shoreham Hotel, Washington, D. C.
Oct. 1-4	Society of Industrial Packaging and Material Handling Engineers, Annual Exposition, Cleveland, Ohio.
Oct. 8-10	American Oil Chemists' Society, Fall Meeting, Chicago, Ill.
Oct. 14-17	American Bakers' Association, Chicago, Ill.
Oct. 22-24	Packaging Institute, 13th Annual Forum, Hotel Commodore, New York, N. Y.
Oct. 24-26	National Pickle Packers Association, Annual Meeting, Sheraton Hotel, Chicago, Ill.
Nov. 5-8	Refrigeration and Air Conditioning Exposition, Navy Pier, Chicago, Ill.
Nov. 12-15	American Bottlers of Carbonated Beverages. Annual Meeting. Armory, Washington, D. C.

1952

Jan. 16-18	Canadian Food Processors Association, Annual Convention, Chateau Frontenac, Quebec, P. Q.
Jan. 17-18	National Pickle Packers Association, Winter Meeting, Roosevelt Hotel, New York, N. Y.
Jan. 19-23	Conventions of the National Canners Association, National Food Brokers Association, and Canning Machinery and Supplies Association, Atlantic City, N. J.
June 8-12	**Institute of Food Technologists, Twelfth Annual Meeting, Grand Rapids, Mich.**

(Information concerning future dates of national and international meetings, conventions and exhibits of interest to food technologists should be sent to the editorial office.)

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Authors of papers intended for publication in FOOD TECHNOLOGY should request from the editorial office a copy of the booklet, entitled "Information and suggestions to authors." Manuscripts submitted for publication in FOOD TECHNOLOGY should follow the style described in this booklet.

The Institute of Food Technologists assumes no responsibility for statements in contributed articles appearing in FOOD TECHNOLOGY. Editorials present only opinions of the writers and do not necessarily reflect policies of the Institute of Food Technologists.

News of the Institute

Presentation of the 1951 Nicholas Appert Award to A. E. Stevenson

(EDITOR'S NOTE: As announced in the May 1951 issue of FOOD TECHNOLOGY, A. E. Stevenson of the Research Department, Continental Can Co., Chicago, Ill., has been selected as recipient of the Nicholas Appert Award for 1951. The Award Medal was presented at the Nicholas Appert Award Dinner during the Eleventh Annual Meeting of the IFT on June 19. Below we print the remarks of Berton S. Clark, Chairman of the Chicago Section of the IFT, who presented the Award, and the recipient's address.)

Introductory Remarks of Berton S. Clark

Ten years ago, the Chicago Section of the Institute of Food Technologists sought a means of recognizing achievement by scientists in the field of food technology. It decided to cast a medal to be awarded annually to the individual most deserving of the honor.

The award took its name from one of the founders of food technology, Nicholas Appert. The Appert story has been told many times and, most recently, only this afternoon by Dr. Prescott at another meeting, at which most of you were present. Consequently, further review of Appert's accomplishments is not necessary at this time.

Just as Appert represented leadership in his field during the early nineteenth century, the Appert Award symbolizes pre-eminence in food technology today. The recipient is elected by a jury of nine members of the Institute. Three jurors are appointed each year by the Executive Committee of the Chicago Section. The Section Chairman acts as chairman of the jury but has no vote. Jurors are unknown to each other and are selected to represent outstanding food technologists in different fields of work.

As in past years, the 1951 jurors came from widely scattered parts of the country—from as far west as California; as far east as New York; as far south as Texas. Secret ballots were cast to nominate and elect the individual most qualified for the award.

In the past decade, the Chicago Section has been privileged to honor such outstanding men as William V. Cruess, Samuel C. Prescott, Charles A. Browne, Avrill W. Bitting, Clyde H. Bailey, C. Olin Ball, Conrad A. Elvehjem, Roy C. Newton, and Thomas M. Rector. It is with pleasure and pride that we add the name of Arthur Earl Stevenson as the 1951 Nicholas Appert medalist to this distinguished list.

Arthur E. Stevenson was born May 16, 1886, near Astoria, Illinois. He attended the University of Kansas, Lawrence, Kansas, where he received the degrees of Ph.C. in 1909 and B.S. in Chemistry in 1912. Since his graduation he has devoted his entire efforts toward scientific advancement in the fields of foods, drugs, and canning technology.

He earned his way through school by working as a part-time chemist with the Kansas State Board of Health from 1909 to 1912, at which time he became a full-time member of the staff until he became associated with the U. S. Department of Agriculture in 1915, doing food and drug work. From 1919 to 1926 he served as a chemist on the technical staff of the National Canners Association. In 1926 he joined the research staff of Continental Can Company, Inc. as Assistant Director. He was promoted to the position of Assistant to the General Manager of Research in 1943 and works in that capacity at the present time.

During World War II he contributed greatly to the cause of tin conservation through membership on the Research Committee of the Can Manufacturers Institute which served as a technical advisory group to the War Production Board. He is now Chairman of that same committee and is actively engaged in similar work with his company. His research on various phases of canning technology has been of invaluable service to the industry during the past 30 years.

He has shared his wide knowledge of canning with others through work on the National Canners Association Processing Committee, as director of the Associates, Food and Container Institute for the Armed Forces, and as a member of the Committee on Packing, Packaging, and Preservation; National Research Council Advisory Board on Quartermaster Research and Development.

His publications and inventions reflect the diversity of his interests and talents. Over the past 39 years he has authored or co-authored some 17 research papers published in technical and trade journals. He holds four patents having to do with canning technology and is the co-inventor of four other patented processes.

He has done outstanding work on the chemical relationship of foods to metal surfaces. These studies related to discoloration in canned beets, preservation of color in canned peas, the effects of hard water in canning, and similar subjects. His extensive work over the years on the processing of foods led to the development of an agitating retort for sterilizing canned foods. Greater stain resistance resulted from his work on the chemical and electrolytic treatment of tin plate surfaces. In still another field of food technology was his recent discovery which established asparagus as an important source of relatively scarce rutin.

This excellent background of achievements reflects the caliber of the tenth Appert medalist. His professional stature makes him well qualified to receive this significant honor and recognition.

So, Arthur Earl Stevenson, by authority vested in me by the Chicago Section, Institute of Food Technologists, it is my very great pleasure to present to you the 1951 Nicholas Appert medal

—for pre-eminence in and contributions to the field of food technology;

—for elucidating the problems of the canning industry, the chemical relationship between foods and metal surfaces, the effect of hard water in the canning process, the proper thermal process for canned food, the discoloration of vegetables;

—for advancing the knowledge of the can-making industry, elaborating the mechanism of tin plate corrosion and developing means for its control;

(Continued on page 6)

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News of the Institute

(Continued from page 4)

—for serving your country during war and peace, helping to conserve the available supplies of tin, aiding the Armed Services in the solution of packaging problems;

—for devoting your life to scientific advancement in the fields of foods, drugs, canning, and can-making;

—for winning the respect and admiration of your fellow men.

And I congratulate you!

1951 Nicholas Appert Award Medal Address

FOOD TECHNOLOGY AND THE CANNING INDUSTRY

A. E. STEVENSON
Research Department, Continental Can Company, Inc.

In the last thirty years there has been a large increase in the number of food technologists and research workers connected with the canning industry and concerned with its problems. There has been a corresponding extension of the application of scientific principles to canning operations. Coincident with these changes a considerable expansion in the production of canned foods has occurred and the variety of foods canned has significantly increased in number.

Considering first the expansion in production this is probably best reflected by the figures on the per capita consumption of canned foods in the United States. Since only a very small percentage is exported and since the imports are correspondingly small, the per capita consumption is a fairly accurate index of the production. Data on this subject is given in the following table:

PER CAPITA CONSUMPTION OF CANNED FOODS IN THE U. S. 1920-1950 [a]

Products	Per Capita Consumption in Pounds			
	1920	1930	1940	1950
Fruits	9.3	12.8	18.8	20.8
Fruit Juices	[b]	0.3	7.2	13.1
Vegetables and Vegetable Juice	18.3	27.8	34.2	41.4
Fish	2.2	3.3	4.2	4.0
Evaporated and Condensed Milk	8.5	13.5	19.2	20.2
Meat	[b]	[b]	4.0	8.5
Soups	1.9	3.1	6.8	7.0

[a] Based on U. S. Department of Agriculture, Miscellaneous Publication No. 691, Consumption of Food in the U. S., and (for 1950) on releases from Bureau of Agricultural Economics.
[b] No data available.

This table alone does not accurately indicate the expansion in production of canned foods since it omits from consideration the growth in population of the U. S. Considering the total per capita consumption of the classes of canned foods listed in the above table, the 1950 figure is approximately 350% of that in 1920 [c] while the population of the U. S. in 1950 was approximately 140% of that in 1920 giving an expansion in production of approximately 490% in this period of 30 years. Part of this increase is due to increased consumption of those foods which were being canned in 1920 and part due to the introduction of new canned foods. This is perhaps most strikingly shown in the case of canned fruit juices, the production of which was practically zero in 1920 and in 1950 was equal to more than half of all fruits combined. Other products in the same classification are tomato juice, baby foods and luncheon meat. The above table does not include the so-called canned specialties, the canning of many of which has been started since 1920 and which if added to the above total would materially increase the per capita consumption.

No figures are available on the number of different foods canned in 1920. The National Canners Association estimates the number of foods canned in 1925 as 180 and in 1950 as 450. Of those canned in 1950 which were not canned in 1925, the majority is small in volume of pack although a few as already mentioned have reached rather large volume.

In 1919 at the time of my first connection with the canning industry, the number of scientifically trained men associated with that industry and allied industries was probably not more than 35. In 1950 it had increased to somewhere around 800 most of whom are in three general groups, those with the N. C. A. Research Laboratories, those with can company laboratories and those with individual canning companies. Included in this number are many who are not strictly food technologists. Some are doing primarily research work on canning problems or on problems related to canning and the classification which has been used is as broad as that for membership in the Institute of Food Technologists. Because of the closely related interests of the canning industry and the can manufacturing industry, the research and technological problems of the former have always been of prime interest to the research laboratories of the can companies and the personnel of these laboratories has made numerous and important contributions to scientific progress in the canning industry.

To what extent the increasing application of scientific principles to canning operations has been a factor in the increase in production and in the canning of new varieties of food, it is impossible to determine. It probably could not be proven that food technology has been a direct determining factor in this increase in production but undoubtedly the food technologist can properly claim a part in increasing the consumption of canned foods because his efforts have resulted in more wholesome canned foods of higher quality prepared in a cleanly and sanitary manner and in increased variety. Indirectly the work of the food technologist has been a very important factor in increased consumption because he has provided the information which has enabled the industry to maintain the confidence of the consumer in the wholesomeness of canned products without which increase in consumption could not have occurred.

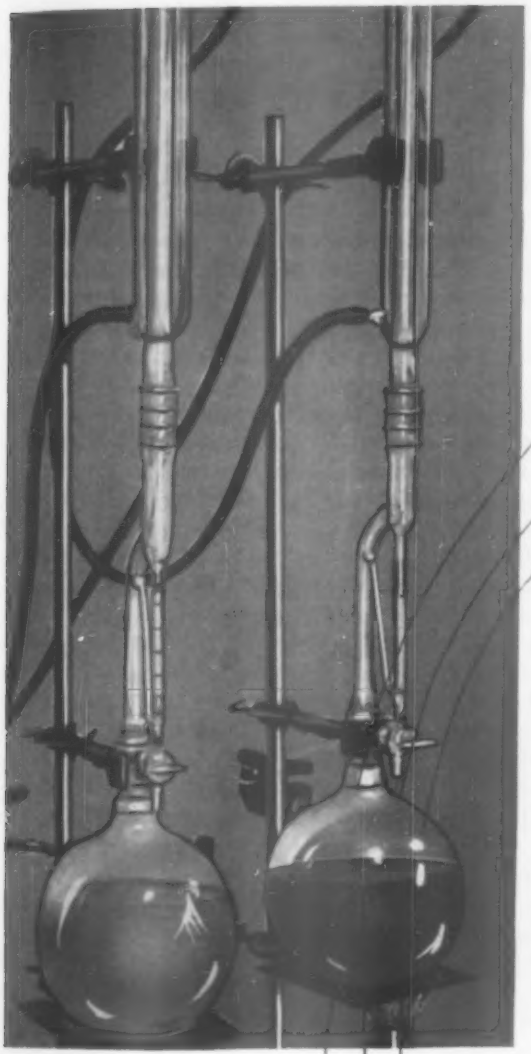
In 1899, nearly 90 years after the invention of canning by Appert, Dr. Victor C. Vaughn, then Professor of Hygiene at the University of Michigan, in an article in *Popular Science Monthly* [d] stated among other

[c] In calculating the total for 1920, canned meat was estimated as 3 lbs. and that of canned fruit juices as zero.

[d] Food Poisoning, Victor C. Vaughn, *The Popular Science Monthly*, Vol. 56, 47-59 (1899).

(Continued on page 8)

The Taste of Sunshine—All the Time



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News of the Institute

(Continued from page 6)

things, "The preparation of canned foods involves the application of scientific principles and since this work is done by men wholly ignorant of science it is remarkable that harmful results do not manifest themselves more frequently than they do." It was about this time that Prescott and Underwood at M. I. T. and Russell at the University of Wisconsin were investigating the bacteriological spoilage of canned foods and laying the groundwork for the application of bacteriology to canning. Others soon followed in helping to repair the deficiency mentioned by Dr. Vaughn. When, in 1913, through the vision and leadership of the late Frank E. Gorrell the National Canners Association established its research laboratories, an impetus was given to the application of scientific principles to the art of canning. Since that time an increasingly larger number of scientifically trained men have become associated with the canning industry or with allied industries.

A brief review of what research and the application of scientific principles to canning have accomplished in the last fifty years may be of interest. This covers the period from the bacteriological work done by Russell and by Prescott and Underwood up to the present time. Lack of time and space will permit mention of but a few of those who have made important contributions to food technology as applied to canning.

After the bacteriological work just cited there is little record of any additional work until 1913 when the Research Laboratories of the National Canners Association were founded. On its initial staff were Dr. W. D. Bigelow and Dr. A. W. Bitting. Dr. Bitting investigated from the standpoint of efficiency some of the mechanical phases of canning operations, such as washing, exhausting and retorting operations. Dr. Bigelow was the active head of the Association's laboratories until his death in 1939 and during this period his leadership was a potent influence in the evolution of developments in canning technology which emanated from the laboratories of the canning and allied industries.

In 1919, the year that I became associated with the National Canners Association Research Laboratories, Dr. C. O. Ball and Dr. J. R. Esty also joined the staff of that organization. Under the leadership of Dr. Bigelow, Dr. Ball began his work on heat transfer and Dr. Esty his work on the heat resistance of bacteria. The results obtained by these investigators and by numerous others who later worked along similar lines extending and amplifying their results have been of the highest importance to the canning industry, permitting the establishment of safe sterilization processes for canned foods and have thus placed the sterilization of these products on a scientific basis. The principles developed have also made it possible to evaluate new methods for the heat sterilization of canned foods, most of which depend on an increase in rate of heat transfer such as by agitation of the cans, by processing at higher temperatures or by flash sterilization and thus have greatly aided in the development of new sterilizing procedures.

The food technologist has also had an important role in the production of better and more uniform quality in canned and packaged foods. Nearly all of the larger canning companies have quality control departments for maintaining constant and uniform standards of quality. For instance, the application of tests for determining the maturity at the time of canning of such products as peas and corn has enabled the production of these canned foods at the optimum maturity of the raw product. Checks on the color, moisture content, pH, acidity of the raw and finished product and on the sterility of the finished product are some of the routine determinations frequently made by canning technologists. Continuous checking of appearance, consistency, tenderness, flavor, etc., are part of the duties of food technologists in many canning factories. This system of controls has gradually developed over the last thirty years as part of the procedure for maintaining uniformity in quality and has been a valuable aid in providing the consumer with better canned foods.

Thirty years ago little was known about the vitamin content of foods and nothing about the vitamin content of canned foods. As information was developed on vitamins in foods, the opinion was frequently expressed in the early twenties, mainly on theoretical grounds, that most of the vitamin content was destroyed during the sterilization of the product. The earlier work on the vitamin content of canned foods was carried out in between 1923 and 1937 under the direction of Dr. E. F. Kohman of the National Canners Association and Dr. W. H. Eddy of Columbia University. The results were encouraging in indicating little destruction of the vitamins then known. A further broad program covering assays for nutritive value, including the vitamin content of all the larger volume canned foods and an investigation of the effect of canning procedures on the vitamin content was instituted in 1941. Planned by a committee representing the National Canners Association and the Can Manufacteurers Institute, with the work carried out mainly in University laboratories and supplemented by additional investigations in the Research Laboratories of the N. C. A. and the can company laboratories, the results have been of great value to those concerned with human nutrition. Dr. C. G. King in speaking of this work has stated in the introduction to the N. C. A. bulletin *Canned Foods in Human Nutrition* — "The intensive study of food composition and retention of nutritive quality during processing and storage of canned foods, sponsored by the National Canners Association and the Can Manufacturers Institute, constitutes an outstanding service to the public as well as to food manufacturers."

From the standpoint of the application of sanitary principles to canning operations the role of the food technologist has become increasingly important. The use of improved cleaning methods for both product and equipment, the simplification of equipment for greater ease of cleaning, the utilization of lightly chlorinated water for washing and cleaning purposes and the application of bacteriological check methods for determining the thoroughness of cleaning operations have been developed by the food technologist and have tended to

promote the canning and packaging of foods under more sanitary and cleanly conditions.

The development of new products is one of the very important duties of the food technologist connected with the canning industry. Among the more important of these may be mentioned some of the canned juices and of more recent development, frozen citrus juice concentrates.

From the standpoint of interior corrosion of cans, color of the product, flavor of the product and retention of vitamins, it is desirable to maintain the oxygen content of the gas enclosed in the can to a minimum. Food technologists working with equipment engineers have developed various means of doing this, such as by vacuum packing, gas packing or replacing the air in the headspace of cans with steam or inert gas. Progress along these lines in the last few years has been mainly in the direction of high speed equipment for performing these operations. Means of reducing the corrosion of the interior of cans either by improvements in packing procedures or by changes in can materials have been originated.

The development of better and more economical metal containers for foods has been one of the more important tasks of the technologists connected with the can companies. Changes in tin plate manufacture during the last twenty years have resulted, first, in the production of tin plate of greater corrosion resistance from cold rolled steel sheets, and second, in the production of electrolytic tin plate which in a little more than ten years after its introduction constitutes more than 50% of the total tin plate manufactured in the United States. Extensive research and development work by the can company laboratories on these new tin plate materials have permitted the manufacture of cans of satisfactory quality and corrosion resistance with the use of approximately 50% of the tin that would have been used in 1940 for the same volume of cans.

While the development of interior enamels for cans cannot be said to be within the field of the food technologist, it is within his field of interest in connection with studies on changes in canned foods. The food technologist has had the task of testing the different enamels and enameling materials to determine their suitability for various purposes and various products. The last thirty years has seen an enormous increase in the use of inside enameled cans for such purposes as preventing staining of interior of the can, preventing corrosion of the interior of the can, and protecting the product from changes in color and flavor. In 1920 less than 10% of the cans made for foods were inside enameled. At present, it is estimated that 75% are inside enameled. The present extensive use of electrolytic plate cans, which, in most cases, must be inside enameled for maximum protection against corrosion has been a large factor in the recent increased use of inside enameled cans. Improvements in enameling procedures such as spray enameling and the application of a strip of protective material on the inside of the side seam have permitted the development of cans suitable for metal sensitive products such as beer.

Technologists of canning companies and those of can manufacturers have collaborated to provide canned foods of better quality, containers of better quality in which to pack them and better packing methods for maintaining the quality until the product reaches the consumer.

Although the food technologists and research workers in the field of food preservation have not solved all of the problems, they have at least placed the canning industry near that goal visualized by Dr. Vaughn where scientific principles are applied to the preparation of canned foods. While not all canned foods are packed under the supervision of scientifically trained workers, there is readily available from various reliable sources a wealth of information which enables any canner to produce a nutritious wholesome properly sterilized canned food.

The canning industry has become more conscious of the value of the application of scientific principles to the preservation of foods. This is indicated by the fact that in many of the larger canning companies former food technologists occupy responsible management positions which is a good thing for the industry, for food technology in general and for the individual food technologist occupying the position.

This brief review of the accomplishments of food technology in the field of canning during the last fifty years would not be complete without mentioning one or two important problems which have received attention but for which no completely satisfactory solution has been found. The most important of these is the production of sterilized canned foods with the minimum effect on the flavor of the product. While progress toward this goal has been made by developing methods of more rapid heat transfer to the product, there is a limit to this procedure which indicates that it is not the best answer to the problem. The application of some of the more recently developed scientific knowledge such as the use of cathode rays, of atomic fission products, or of antibiotics may, in the not too remote future, provide a solution to this problem.

The retention in the canned product of the green color of chlorophyll containing vegetables is a desirable characteristic and considerable time and money have been spent in an endeavor to solve this problem. Although some progress has been made the procedures which have been developed have affected other desirable characteristics of the canned product and an entirely satisfactory solution of the problem is still to be found.

Technology implies the application of known scientific principles to production problems and in the canning industry as in other industries the fundamental knowledge must be available for application. Sometimes this knowledge is not used because of failure to recognize its application or it may be difficult to make a practical application of the principles. The first of the problems mentioned above, that is, the sterilization of canned foods by means other than heat, is in the category of those for which no basic information for their possible solution has been available. The second, that is, the retention of chlorophyll is one where the basic information had been available but its application had not at

News of the Institute

first been recognized and practical means of using this basic information were difficult to develop.

Both of these illustrate the fact that opportunities for the food technologist in the canning industry still exist and that the development of new scientific principles and alertness to recognize the application of new or old ones will provide food technology with means of further progress in an industry which is always ready and willing to try anything which offers opportunity for further improvement of its products.

COMMITTEE APPOINTMENTS

President Charles N. Frey has announced the following committee appointments for 1951-1952:

Committee to Represent IFT at American Association for Advancement of Science:

Carl R. Fellers, University of Massachusetts, Amherst, Massachusetts, and Paul F. Sharp, University of California, College of Agriculture, Giannini Hall, Berkeley 4, California.

Committee to Study Awards and to Recommend Procedures of Acceptance of Gifts, Donations and Endowments:

Chairman: Bernard E. Proctor, Massachusetts Institute of Technology Cambridge, Mass. *Members:* Roy C. Newton, H. W. Vahlteich, H. R. Kraybill, Paul F. Sharp, J. A. Dunn, Conrad A. Elvehjem, A. W. Thomas, Victor Conquest, L. V. Burton, Charles L. Smith, and J. C. Moyer.

Babcock Award Committee:

Alfred J. Finberg (52), F. P. Griffiths (52), Fred W. Wenzel (52), Victor Conquest (53), W. V. Cruess (53), F. C. Blanck (53), Emil M. Mrak (54), Arthur N. Prater (54), and Carl R. Fellers (54).

Committee on Chemicals in Foods:

Chairman: Bernard E. Proctor, Massachusetts Institute of Technology, Cambridge, Mass. *Members:* F. C. Blanck, Bernard L. Oser, M. A. Joslyn, Charles Kaufman, William R. Johnston, Harvey K. Murer, David B. Hand, H. R. Kraybill, Oscar Skovholt, R. Adams Dutcher, Robert K. Hower, Herbert E. Robinson, Charles A. Glabau, E. J. Cameron, F. Hugh Lawford, Albert F. Elder, W. Ray Junk, Louis B. Howard, Albert A. Schaal, and F. L. Gunderson.

Committee on Citrus Products:

Chairman: W. E. Baier, California Fruit Growers Exchange, 616 East Grove Street, Ontario, Calif. *Members:* E. A. Beavens, Charles H. Brokaw, E. J. Cameron, Horace Campbell, Raymond E. Cox, Kenneth G. Dykstra, Ellis R. Fehlberg, John L. Heid, Chester W. Lindsay, Emil M. Mrak, Vernon C. Praschan, Wallace R. Roy, M. K. Veldhuis, Fred W. Wenzel, Jr., W. Clifford Scott, Everette M. Burdick, Reese H. Vaughn, and Louis G. MacDowell.

Committee on Constitution:

Chairman: Aksel G. Olsen, General Foods Corporation, 1125 Hudson Street, Hoboken, N. J. *Members:* Arthur N. Prater, H. C. Diehl, and C. O. Ball.

Committee on Education and Curriculum:

Chairman: L. E. Clifcorn, 469 Washington Street, Elmhurst, Ill. *Members:* R. T. Bohn, John L. Heid, Walter A. Maclinn, Roy E. Marshall, R. W. Pilcher, H. N. Riley, G. C. Scott, Ernest H. Wiegand, M. A. Joslyn, Louis B. Howard, Robert K. Phelan, Lauren B. Hitchcock, Howard D. Brown, Roy C. Newton, William F. Geddes, Fredus N. Peters, Reese H. Vaughn, and W. B. Robinson.

Committee on Exhibits:

Chairman: R. C. Sherwood, Sterwin Chemicals, Inc., 1450 Broadway, New York 18, N. Y. *Members:* L. E. Clifcorn, Charles S. Lawrence, Stephen L. Galvin, W. Ray Junk, E. Everett Meschter, R. B. Wakefield, Hugh T. Griswold, Charles L. Smith, Roy H. Walters, Roger H. Lueck, Arnold H. Johnson, and Arthur N. Prater.

Committee on Finance:

Chairman: Philip K. Bates, Riker Laboratories, Inc., P. O. Box 3157, Terminal Annex, Los Angeles 54, Calif. *Members:* B. S. Clark, Aksel G. Olsen, and Paul F. Sharp.

Committee on Food Engineering Award:

Chairman: S. C. Prescott, 77 Massachusetts Avenue, Cambridge, Mass. *Members:* E. A. Beavens, F. W. Fabian, W. V. Cruess, Arthur W. Farrall, C. R. Fellers, Ernest A. Fieger, William F. Geddes, David B. Hand, Ira A. Gould, Jr., B. L. Herrington, M. E. Highlands, Louis B. Howard, Walter A. Maclinn, John R. Matchett, Emil M. Mrak, John E. Nicholas, Milton E. Parker, Bernard E. Proctor, H. A. Schuette, John A. Shellenberger, George F. Stewart, Ernest H. Wiegand, W. R. Woolrich, H. C. Diehl, and M. J. Copley. *Non-IFT Member:* Howard C. Douglas.

Representative of the IFT on the Food and Nutrition Board National Research Council:

F. C. Blanck, Mellon Institute of Industrial Research, University of Pittsburgh, Pittsburgh 13, Pa.

Committee on Frozen Foods:

Chairman: Ernest H. Wiegand, 302 North 29th Street, Corvallis, Oregon. *Members:* William J. Finnegan, Frank A. Lee, Herbert S. Madsen, Daniel G. Sorber, Gladys E. Vail, John T. R. Nickerson, Jasper G. Woodroof, Mary E. Pennington, Gerald A. Fitzgerald, Donald K. Tressler, and Alvin I. Nelson.

Committee of Liaison with Armed Forces:

Chairman: Berton S. Clark, Research Department, American Can Company, Maywood, Ill. *Members:* L. V. Burton, H. C. Diehl, R. A. Isker, Albert L. Elder, Donald K. Tressler, H. W. Vahlteich, Lawrence Atkin, and C. G. Harrel.

Committee on Membership:

Chairman: Emil M. Mrak, 339 Hilgard Hall, University of California, Berkeley 4, Calif. *Members:* Milton E. Parker, J. J. Sampey, William F. Geddes, Henry A. Schuette, G. M. Dack, Albert A. Schaal, Edwin L. Mitchell, Charles S. Lawrence, and the chairmen of all membership committees of Regional Sections.

National Program Committee for 1952:

Chairman: Roy E. Marshall, Room 101 Agricultural Bldg., Michigan State College, East Lansing, Mich. *Members:* L. E. Clifcorn, A. L. Elder, Ira D. Garard, C. G. Harrel, E. W. Hopkins, R. A. Isker, H. S. Mitchell, E. M. Mrak, Carl S. Pederson, A. N. Prater, B. E. Proctor, J. G. Woodroof, and George F. Stewart.

Committee on Nominations:

Chairman: H. S. Mitchell, Swift & Company, Union Stock Yards, Chicago 9, Ill. *Members:* Stephen L. Galvin, W. Ray Junk, Paul F. Sharp, C. R. Fellers, and chairmen of all Regional Sections.

Committee on Pectin Standardization:

Chairman: John J. Willaman, Plymouth Meeting, Pa. *Members:* George L. Baker, J. J. R. Bristow, Glenn H. Joseph, H. C. Campbell, Z. I. Kertesz, W. Dayton Maclay, E. Everett Meschter, H. H. Mottern, William A. Rooker, and W. Lowe Walde. *Non-IFT Members:* Page R. Boyles, L. K. Harper, and H. T. Lee.

Committee on Publications:

Chairman: John H. Nair, Thomas J. Lipton, Inc., 1500 Hudson Street, Hoboken, N. J. *Members:* Philip K. Bates, C. R. Fellers, George F. Stewart, Bernard L. Oser, H. R. Kraybill, H. C. Diehl, Lauren B. Hitchcock, Paul F. Sharp, L. V. Burton, W. D. Pheteplace, Jr., Carl S. Pederson, William F. Geddes, Arthur N. Prater, and Paul Logue.

(Continued on page 12)

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News of the Institute

(Continued from page 10)

Committee to Study the Problem of Publicity and Public Relations:

Chairman: Paul F. Sharp, University of California, College of Agriculture, Giannini Hall, Berkeley 4, Calif. *Members:* Paul D. V. Manning, Lloyd A. Hall, Milton E. Parker, Gaylord P. Whitlock, C. G. King, L. V. Burton, Daniel Melnick, Roger H. Lueck, M. E. Highlands, E. Everett Meschter, Roy H. Walters, and H. S. Olcott.

Committee on Qualifications:

Chairman: E. M. Chace, 1842 N. Gramercy Place, Hollywood 28, Calif. *Members:* F. C. Blanck, James C. Moyer, and Roy E. Morse.

Committee on Regional Sections:

Chairman: Alan C. Richardson, California Packing Company, 215 Fremont Street, San Francisco, Calif. *Members:* F. E. Atkinson, W. H. Cook, R. M. DeWaters, J. A. Dunn, C. J. Meister, W. Clifford Scott, Ernest H. Wiegand, Roger V. Wilson, Fred W. Wenzel, Jr., B. W. Clarke, and Arnold H. Johnson.

Committee on Student Membership:

Chairman: Ira D. Garard, New Jersey College for Women, New Brunswick, N. J. *Members:* Arthur S. Levine, C. Wilson Eddy, Emil M. Mrak, Robert G. Tischer, Oliver J. Worthington, Walter A. Maclinn, Amihud Kramer, F. W. Fabian, William F. Geddes, George F. Stewart, John L. Heid, H. A. Schuette, G. M. Dack, Samuel A. Goldblith, and John H. Kilbuck.

Committee on Taste Testing and Consumer Preference:

Chairman: George F. Garnatz, 2810 Urwiler Avenue, Cincinnati 11, Ohio. *Members:* Emil M. Mrak, E. C. Crocker, Helen L. Hanson, Ernest E. Lockhart, Roy E. Morse, Vernon M. White, Virgil O. Wodicka, Robert K. Hower, R. F. Light, William B. Esselen, Jr., Catherine Personius, Esther L. Batchelder, Arnold H. Johnson, Albert A. Schaal, and Frank L. Seymour-Jones.

Regional Section News

NEW YORK SECTION

The New York Section, host at the 11th Annual IFT Meeting, welcomed 1200 members and their wives at the Hotel New Yorker, making this meeting the largest in the history of the Institute. In addition, 200 technical representatives of 50 exhibitors were on hand to supply information of new products, equipment and services.

Dr. L. W. Tuttle, U. S. Atomic Energy Commission, opened the program on Sunday evening with an illustrated presentation on the Medical Implications of Atomic Weapons. Following this, 500 of the members renewed old acquaintances at the informal get-together.

During the 3-day formal session members taxed the meeting rooms to capacity to hear and participate in the discussion of 119 papers on widely varied topics pertaining to all phases of food technology.

Highlighting the social calendar of events was the theater party at the Winter Garden, where the registrants enjoyed one of Broadway's finest musicales, MAKE A WISH. Ladies were entertained with a luncheon-fashion show, innumerable trips and radio-TV shows.

Two eminent food technologists were honored for their contribution to food science. Samuel Cate Prescott received the Stephen M. Babcock Award, while Arthur E. Stevenson was presented the Nicholas Appert Award.

Andersen's Foods, Inc., was awarded the Food Engineering plaque for their contribution to the development of aseptic canning procedures.

Following the formal program, 300 members visited local plants and laboratories of special interest.

SOUTHERN CALIFORNIA SECTION

The following are the officers of the Section elected for 1951-1952:

Chairman: H. J. Deuel, Jr., Dean of the Graduate School, University of Southern California, 3518 University Avenue, Los Angeles 7, California.

Chairman-elect: Milton E. Powell, Knudsen Creamery, 1974 Santee Street, Los Angeles 11, California.

Secretary: G. L. Merchant, Merck & Co. Inc., 1855 Industrial Street, Los Angeles, California.

Treasurer: Margaret G. Morehouse, Dept. of Biochem. and Nutr., University of Southern California, 3518 University Avenue, Los Angeles 7, California.

Executive Committee: J. S. Lawless, Frosted Fruit Products, 200 Center Street, Los Angeles 12, California; P. J. Rich, 641 Bonita Street, Monrovia, California; J. B. Pardieck, California Vegetable Conc., Inc., 2067 Clarendon Avenue, Huntington Park, California; G. M. Cunningham, 3499 San Pasqual Street, Pasadena 10, California; L. B. Rockland, 263 S. Chester Avenue, Pasadena 5, California. (Alternate) R. E. Cox, Bireley's Div. General Foods Corp., 1127 N. Mansfield Avenue, Los Angeles 38, California.

Section Councilors: M. S. Burns, 2460 E. Glenoaks, Glendale, California; E. A. Beavens, 263 S. Chester Avenue, Pasadena 5, California; R. M. Hagen, California Consumers Corp., 230 W. Jefferson Blvd., Los Angeles 7, California. (Alternate) W. E. Baier, California Fruit Growers Exchange, 616 E. Grove Street, Ontario, California.

PERSONNEL

A. K. Balls, Head of the Enzyme Division in the Western Regional Research Laboratory, Albany, has accepted a position as Professor of Enzyme Chemistry, Purdue University, Lafayette, Indiana. Dr. Balls has been employed in the Bureau of Agricultural and Industrial Chemistry of the U. S. Department of Agriculture for about 22 years.

Roy E. Morse, head of the Food Technology Laboratories of the Monsanto Chemical Co., Anniston, Alabama, has joined Kingan and Co. of Indianapolis, Indiana as Director of Research. Before going to Monsanto, Dr. Morse was Associate Professor of Food Technology at the University of Georgia.

Hugh H. Mottern has been appointed Manager of the Research Laboratories, Kraft Foods Co., Glenview, Ill. Dr. Mottern recently spent several years with the H. J. Heinz Co. of Pittsburgh, Pa., where he became Research Director in 1947. Formerly he was with the U. S. Department of Agriculture.

Carl S. Pederson, Professor of Bacteriology, New York State Agricultural Experiment Station, Cornell

(Continued on page 28 following technical papers)

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	Pectin esterase	Experimental	Demethoxylates pectin without hydrolysis of the galacturonic acid chain. pH range 3.5-5.
Proteolytic	RHOZYME P-11	Commercial	Hydrolyze proteins to peptides and amino acids. pH ranges 5.5 - 8.5 (Relative amounts of peptides and amino acids will differ for each proteolytic enzyme.)
	Protease 15	Experimental	
	Protease 16	Experimental	
Amylolytic	RHOZYME S	Commercial	Hydrolysis of starch to dextrins, maltose and glucose. Contain both an alpha amylase and a strong glucogenic principle. pH range 5-6. RHOZYME S is a purified enzyme; RHOZYME T-22 the crude product.
	RHOZYME T-22	Commercial	
	RHOZYME DX	Commercial	Hydrolysis of starch to dextrins. Heat stable. pH range 5.5-6.5.
Lactase	Lactase B	Experimental	Hydrolysis of lactose to glucose and galactose. pH range 6.1-7.5.

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BY-LAWS

of the

Institute of Food Technologists

Adopted by the Council on June 17, 1951

ARTICLE I

Order of Business

Section 1. At meetings of the Members of the Institute the order of business shall be in accordance with the program prepared by the Committee on Programs, and approved by the President.

Section 2. Rules contained in "Pocket Manual of Rules of Order" by Henry M. Roberts shall determine the parliamentary practices of the Institute in all cases where it applies, when not inconsistent with the Constitution or By-Laws of the Institute.

ARTICLE II

Dues

Section 1. The dues year shall be from January 1st to December 31st of one calendar year.

Section 2. The dues for Professional Members and Members shall be $7.50 per year; for Student Members $2.50 per year. These dues shall include a subscription to FOOD TECHNOLOGY and 50% of the dues paid shall be so credited on the books of the Institute.

Section 3. When an applicant has been elected to membership of any class his membership shall become effective immediately and his subscription to FOOD TECHNOLOGY shall begin with the next issue. The payment received with the application shall be credited to the member's account at the rate of 65c per month for the remainder of the calendar year, and the balance of the payment credited to the next succeeding year. In the case of Student Members the entire payment shall be credited to the current year.

ARTICLE III

Meetings

Section 1. The Council shall fix the time and place for the annual meeting of the Institute. One or more Regional Sections shall be host to the Institute at such meetings. The Regional Section or Sections desiring to be host at an annual meeting shall extend an invitation to the Council at least two years prior to the date of the meeting, setting forth the time and place it is proposed to hold such meeting.

ARTICLE IV

Fiscal Procedure

Section 1. The fiscal year of the Institute shall be from May 1st of one calendar year to April 30th of the following calendar year.

Section 2. The Council shall adopt an annual budget, appropriating funds for the operation of the Institute for one year in advance. No expenditures in excess of the budget shall be made except upon specific authorization by the Council. Should no new budget be adopted prior to expiration of a budget period, expenditures may be continued on a month to month basis at the rate prescribed in the last budget, until such time as a new budget is adopted.

ARTICLE V

Executive Secretary

Section 1. *National Headquarters.* The Executive Secretary shall keep the minutes of meetings of the Institute, the Council, and the Executive Committee of the Council. He shall be the custodian of the books of account, membership rolls, and records of the Institute. He shall receive all monies paid to the Institute and promptly deposit same in the designated depositories. He shall keep a double entry set of books with accounts for all items shown in the annual budget and such other accounts as may be necessary. The original records of entry shall be in the form of vouchers that identify the debits and credits by account and shall carry a running cash balance. The vouchers shall be prepared in triplicate. The original shall be filed in the office of the Executive Secretary, and all original invoices, receipts and supporting papers filed therewith. The duplicate copy of the voucher shall be forwarded to the Treasurer and the triplicate copy to the President. The Executive Secretary shall prepare quarterly and send to each member of the Council a budget status report listing all budget items and showing the amounts received or expended under each, and such other information as the Council may deem necessary. The Executive Secretary shall maintain the National Headquarters of the Institute, and shall purchase, hire, or contract for such services, supplies and equipment as are necessary for its operation and within the limitations of the budget fixed by the Council. He shall cause the accounts of the Institute to be audited annually by a certified public accountant. He shall make an annual report to the Council, showing the status of memberships with gains and losses for the year; a financial statement, including the annual report of audit; a resume of the operations of his office; and such other items as the Council may from time to time direct. The Council shall determine annually the amount of the surety bond of the Executive Secretary.

Section 2. *Publications.* The Executive Secretary shall be the Business Manager of the journals published by the Institute. As Business Manager he shall purchase or hire such supplies and services that he finds necessary for the operation of the journals, excepting those pertaining to editing and manufacturing; provided that no obligations in excess of budget limitations shall be incurred, and no agreement that cannot be terminated within 60 days shall be made without specific authorization by the Executive Committee. The foregoing shall not apply to the acceptance of space contracts submitted by advertisers. He is authorized to accept space contracts from and assign space positions to advertisers within those sections of the journals wherein the Editor has authorized advertising to appear. He shall refer to the Editor for decision on acceptance or rejection any advertising of an apparently unethical nature or inconsistent with the professional standards of the journals. He shall fix the advertising rates, and negotiate contracts for the manufacture of the journals, subject to approval by the Executive Committee of the Council; and the Council by this By-Law delegates to its Executive Committee authority to approve such rates and contracts. The approval of the Executive Committee shall be certified on original manufacturing contracts and rate schedules by the President. He shall keep the Editor informed of current incomes and costs of the journals in order that the latter may intelligently plan issues within budget limitations.

Section 3. *Funds.* The funds of the Institute shall be deposited only in banks covered by Federal Deposit Insurance so long as that insurance is available. There shall be two or more accounts:

a. *A General Account* (or accounts) into which all monies received shall be deposited. All checks drawn on this account shall bear the signature of any two of the following listed officials of the Institute: The Executive Secretary, the Treasurer and the Assistant Treasurer. The signature of the Assistant Treasurer will be used only when the Treasurer or the Executive Secretary is not available.

b. *An Operating Account for all Operating Expenditures.* Deposits in this account shall be only by checks drawn on the General Account or accounts. The balance to be carried in the Operating Account shall not exceed $10,000. Checks drawn on this account shall be signed by the Executive Secretary.

Section 4. Procedure for handling applications for membership:

a. *Applications for Membership.* Upon receipt of an application for membership in the Institute, accompanied by a payment of $7.50, the Executive Secretary shall verify the completeness of the application and the eligibility of the endorsers. The application shall then be forwarded to the Chairman of the Committee on Qualifications and the applicant notified of the action taken. Upon election the applicant shall be so notified and furnished a membership card for the current year.

b. *Applications for Student Membership.* Upon receipt of an application for Student Membership, accompanied by a payment of $2.50, it shall be processed as outlined in a. above.

c. In the event an applicant is not elected to any class of membership, he will be so advised and his payment refunded.

Section 5. *Change of Status.*

a. When a Member desires to change his status from Member to Professional Member, he shall complete that portion of the membership application form relating to experience and present employment, sign, and forward it to the Executive Secretary, who shall send it to the Chairman of the Committee on Qualifications. If approved by that Committee, the Executive Secretary shall change the membership records accordingly and so inform the member. If the change of status is disapproved by the Committee, the Executive Secretary shall so notify the Member, giving the reasons for disapproval.

b. When a Student Member has graduated and entered upon a career in Food Technology by accepting employment in that field, his status may be changed to Member upon his furnishing the Executive Secretary a written statement showing date of graduation, degree receeived, name of employer, and position held. A Student Member whose status is changed to Member shall not be required to pay the difference in dues for the remainder of the current calendar year unless he desires to surrender his Student Membership card and receive a Member's card, in which case the difference in dues shall be prorated at 45c per month for the remainder of the current calendar year.

c. When a Student Member leaves his educational institution prior to graduation, or does not enter a career in Food Technology after graduation, and nevertheless desires to become a Member, the procedure for change of status shall be as prescribed in a. above.

Section 6. Original applications for Student Membership and annual renewals of such memberships must bear a certificate that the applicant is a registered student at the named educational institute. This certificate must be signed by a faculty member of the institution who is also a member of the Institute and who has been appointed official liaison representative for that educational institution. Appointment of the official liaison representative shall be made by the chairman of the Regional Section in whose jurisdiction the educational institution is located.

ARTICLE VI

Treasurer and Assistant Treasurer

Section 1. *Appointment and Term of Office.* The Treasurer shall be appointed annually by the Council and shall be eligible for reappointment at the discretion of the Council. He shall be ex-officio Chairman of the Finance Committee. The Council shall determine annually the amount of the surety bond of the Treasurer.

Section 2. *Budget.* The Treasurer shall cause to be prepared, the annual budget of the Institute. The budget shall be reviewed by the Finance Committee before presentation to the Council.

Section 3. *Funds.* The Treasurer shall have general supervision over the financial records of the Institute and shall present to the Council annually a report of all receipts and disbursements of Institute funds.

Section 4. *Assistant Treasurer.* An Assistant Treasurer shall be appointed annually by the Council and shall be eligible for re-appointment at the discretion of the Council. The Assistant Treasurer shall, in the absence of the Treasurer, perform the duties of that office and such other duties as may be from time to time assigned to him by the Council. The amount of the surety bond of the Assistant Treasurer shall be determined annually by the Council.

ARTICLE VII

Editor and Editorial Board

Section 1. The Editor of Institute journals shall be appointed annually by the Council and shall be eligible for reappointment at the discretion of the Council. The Editor shall be responsible to the Council for the production, issue and quality of the journals. He shall determine the contents, size and makeup of each issue within the limitations of the budget fixed by the Council. He shall designate those portions of the journals wherein advertising may appear. He shall have authority to cause the cancellation of space contracts for or the rejection of advertising that he deems unethical or inappropriate for Institute journals. He shall be guided by the policies fixed by the Council with respect to the scope and type of subject matter carried in Institute journals. He shall submit annually to the Council a report dealing with the operations of his office and containing such recommendations as he deems appropriate. Should any differences arise between the Editor and the Business Manager of the journals or other officers or Committees of the Institute with respect to editorial functions the matter shall be submitted to the Executive Committee of the Council, and the Council by this By-Law delegates to its Executive Committee authority to resolve such differences.

Section 2. *Associate Editors.* There shall be Associate Editors for each journal. Their number shall be determined from time to time by the Council. Associate Editors shall be appointed by the Editor subject to approval by the Executive Committee of the Council and the council by this By-Law delegates to its Executive Committee authority to approve such appointments. Associate Editors shall be appointed for terms of three years, and may not be reappointed to succeed themselves. Associate Editors shall perform such duties as may be assigned to them by the Editor.

Section 3. *Editorial Board.* There shall be an Editorial Board consisting of the Editor, who shall be ex-officio Chairman, and the Associate Editors of the Institute journals. The Editorial Board shall assist the Editor in interpreting and carrying out the policies of the Council and perform such other functions as may be designated by the Editor. The operating procedures of the Board shall be prescribed by the Editor. The Board shall have final authority to accept or reject technical papers for publication in the journals.

Section 4. Rules governing the presentation of papers at annual meetings.

(1) The term "paper" shall include any presentation for which the title and author are listed on the program and which may be reduced to writing either prior to, during, or subsequent to the meeting at which they are presented.

(2) No paper may be presented at an Annual Meeting, which has been offered for publication in any journal except those of the Institute of Food Technologists, unless it has previously been released by the Editor and provided it has not appeared in print prior to the meeting.

(3) No paper shall be presented at an Annual Meeting unless its title appears on the program for the Meeting.

(4) Each paper presented before an Annual Meeting shall be the property of the Institute for publication in the Institute's journals. The Editor of FOOD TECHNOLOGY and of FOOD RESEARCH is empowered to release such papers for publication elsewhere. No papers shall be presented at the Meeting unless the author agrees to the condition that the paper is the property of the Institute.

(5) In case a title has been submitted and it becomes clear to the Program Committee that arrangements violating the above points have been made by the authors, the paper will be omitted from the program and will not be allowed to be delivered. (The purpose of this provision is to prevent the increasing number of papers

(Continued on page 18 following technical papers)

How to make good foods better

FOR GRITS . . . FOR MEAL. Corn meal and grits have long been American favorites. Today you know that these fine foods have only small amounts of certain vitamins and other nutrients essential to human health. Moreover, degermed meal and grits unavoidably lose some of this essential nutritive value in milling. Now, by the simple, scientifically-proven means of enrichment you can restore important vitamins and minerals (or increase them in whole corn meal which is naturally low in niacin and iron). When you make your products better nutritionally you are "Making A Good Food Better"*, and you are helping to protect the health of a large number of the nation's people. Remember: better products have a better chance to sell better.

QUICK FACTS ABOUT ENRICHMENT

The requirements for various vitamins and minerals to meet Federal Standards of Identity for ENRICHED Corn Meal and Corn Grits are as follows. Figures represent milligrams per pound. Levels must not fall below 85% of minimum figures after a specific rinsing test described in the Federal Standards of Identity.

Thiamine (B_1)	2.0- 3.0
Riboflavin (B_2)	1.2- 1.8
Niacin	16.0-24.0
Iron	13.0-26.0

Calcium, 500 mg.—750 mg. per pound and vitamin D, 250 U.S.P. units—1,000 U.S.P. units per pound are permissible additions to enriched corn meal and grits.

** The title of a color film on the enrichment of corn meal and grits produced by Clemson Agricultural College. This film is widely recognized as an outstanding educational film on food and nutrition and is being shown by many health departments and schools.*

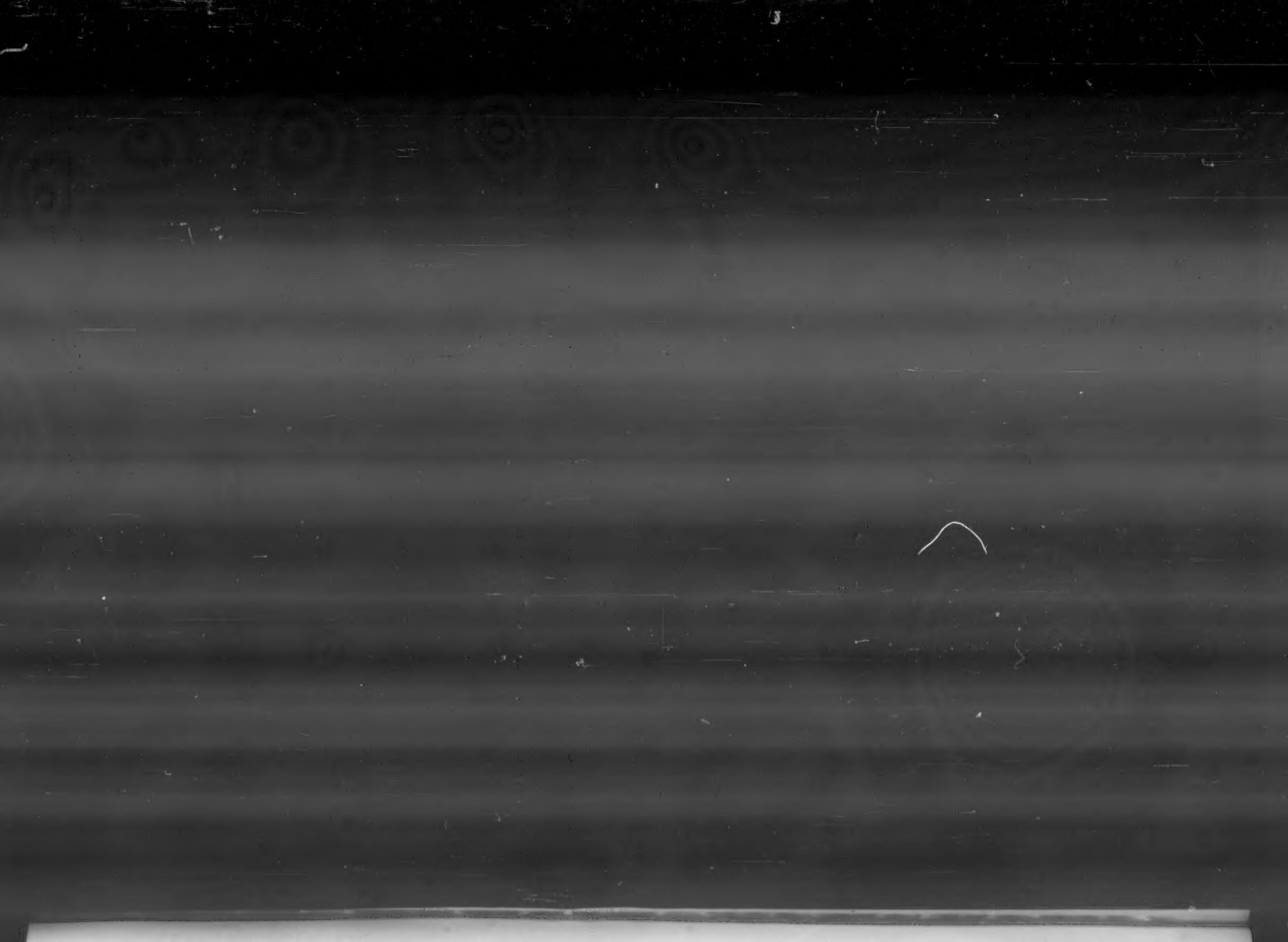
VITAMIN DIVISION • **HOFFMANN-LA ROCHE INC.** • NUTLEY 10, N. J.

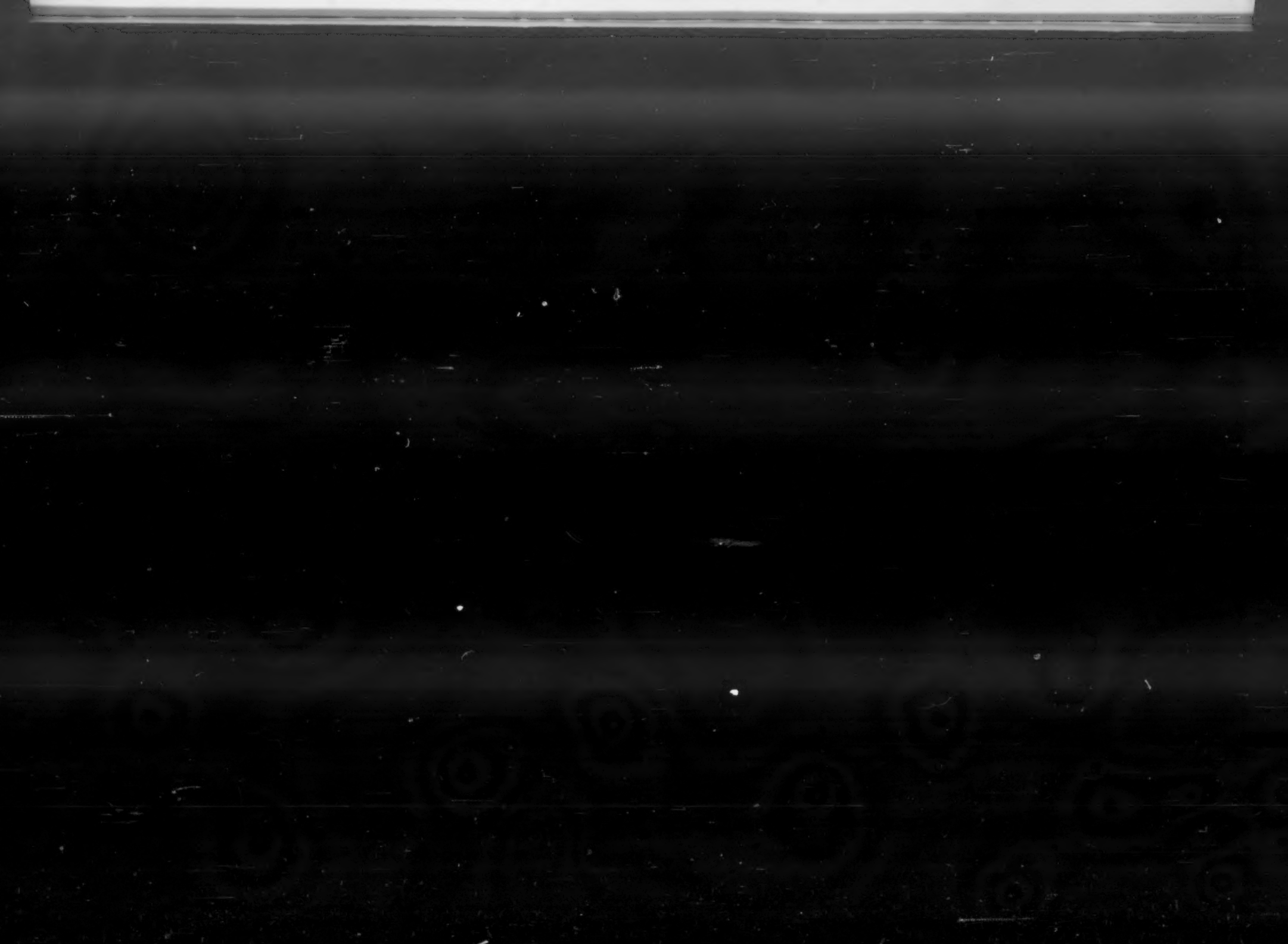
In Canada: Hoffmann-La Roche, Ltd., Montreal, Que.

ROCHE

VITAMINS FOR ENRICHMENT

Keeping faith with nature





By-Laws

(Continued from page 15 preceding technical papers)

which by some arrangements are given at the Annual Meeting but which are printed in journals other than those of the Institute of Food Technologists in violation of points 2 and 4.)

(6) The Institute shall not be responsible for statements or opinions advanced by individuals in papers or discussions before its Meetings.

(7) The President shall have authority to exclude any paper from the program at any time prior to its presentation at the Meeting of the Institute.

ARTICLE VIII

Subsidiary Organizations

Section 1. *Regional Sections.* The Council may grant Regional Section Charters to organized groups of members of the Institute residing in the same geographical area when the following conditions have been met:

a. That the paid-up membership of the organization shall include not less than 25 members of the Institute, excluding Student Members.

b. That the organization has adopted a Constitution and/or By-Laws not in conflict with the Constitution of the Institute.

c. That the organization has held not less than three stated meetings during the preceding twelve months.

d. That the organization has elected three individuals to hold the offices of Chairman, Secretary and Councilor.

e. That the organization has petitioned the Council in the form of a letter addressed to the Executive Secretary. This letter shall include:

1. The names and addresses of the members.
2. The names and addresses of the Chairman, Secretary and Councilor.
3. Date of organization and dates on which the three last meetings were held.
4. The name the Regional Section is to bear.
5. The geographical boundaries of the area the organization desires to include.
6. A copy of its Constitution or By-Laws.
7. The petition shall be signed by the Chairman and Secretary of the organization.

The Executive Secretary shall verify the fact that a, b, c, and d above have been complied with and submit the request for granting a charter to the Committee on Regional Sections for study and recommendations.

The Committee on Regional Sections shall render a report to the Executive Secretary indicating its recommendation with reference to establishment of the proposed section and its boundaries. The Executive Secretary shall then submit the question of granting a charter to the Executive Committee of the Council for approval or disapproval. The Council, by this By-Law, delegates to its Executive Committee the authority to approve or disapprove petitions for regional section charters.

When the Executive Committee of the Council has approved the charting of a new section, the Executive Secretary shall officially notify the new regional section of such approval.

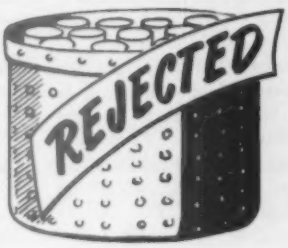
Section 2. *Student Chapters.* The Council may grant a Certificate for the establishment of a Student Chapter to an organization of Student Members of the Institute attending one educational institution when the organization petitions the Council for such a Certificate. Student Chapter Certificates may be issued when the following requirements have been met.

a. That the organization consists of not less than ten Student Members of the Institute registered at one educational institution.

b. That the organization has had an uninterrupted continuity of existence of not less than 1 year during which it *shall* have held not less than three stated meetings.

(Continued on page 21)

THOUSANDS OF CANS SPOILED



BUT ATI COOK·CHEX COULD HAVE PREVENTED IT AT PENNY COST

ATI Cook-Chex guard your quality. They warn of non-cooking or undercooking. They check on conditions inside your retort where cooking is actually done. They indicate cold spots and air pockets. Easy to use. Very low in cost. Write for samples and try them yourself.

Write for free supply of samples for trying in your own retorts.

Quality Control Division
Dept. FT-9, 5000 West Jefferson Blvd.
Los Angeles 16, California

Send samples of ATI Cook-Chex and valuable quality control data.

My name..... Title.....

Company.....

Address..... City..... State.....

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PHILIP K. BATES
Riker Laboratories, Inc.
P. O. Box 3157, Terminal Annex
Los Angeles 54, California

Executive Secretary

CHARLES S. LAWRENCE
176 W. Adams Street
Chicago 3, Illinois

Executive Committee of the Council

Charles N. Frey, Paul F. Sharp, Bernard E. Proctor, Hugh T. Griswold, Lloyd A. Hall, Aksel G. Olsen, George F. Stewart and Ray B. Wakefield.

Councilors-at-Large

Terms Expire 1952: R. Adams Dutcher, H. R. Kraybill, E. M. Mrak, Aksel G. Olsen, Carl S. Pederson.

Terms Expire 1953: L. E. Clifcorn, L. A. Hall, R. B. Wakefield, G. F. Stewart, Wm. B. Esselen.

REGIONAL SECTION CHAIRMEN, SECRETARIES AND COUNCILORS

CHICAGO, No. 1: Chairman, B. S. Clark. Secretary, Dorothy Ann Huber, Chicago Quartermaster Depot, 1849 W. Pershing Road, Chicago 9, Ill. Councilors, L. B. Howard, W. J. Shannon, B. S. Clark, L. A. Hall, V. O. Wodicka.

NORTHERN CALIFORNIA, No. 2: Chairman, E. L. Mitchell. Secretary, J. H. Kilbuck, Div. of Food Technology, Univ. of Calif., Berkeley 4, Calif. Councilors, R. N. Berry, L. G. Petree, H. T. Griswold.

NORTHEAST No. 3: Chairman, Loren B. Sjostrom. Secretary, Charles H. Shackelford, Great Atlantic & Pacific Tea Co., 151 Northern Ave., Boston 10, Mass. Councilors, Arthur S. Levine, Ernest C. Peakes.

SOUTHERN CALIFORNIA, No. 4: Chairman, H. J. Deuel. Secretary, Gordon L. Merchant, Merck & Company, Inc., 1855 Industrial St., Los Angeles 21, Calif. Councilors, M. S. Burns, E. A. Beavens, R. M. Hagen.

ST. LOUIS, No. 5: Chairman, Paul P. Aldrich. Secretary, Barbara Hall, Anheuser-Busch, Inc., 713 Pestalozzi, St. Louis 18, Mo. Councilor, Eugene V. Nay.

NEW YORK, No. 6: Chairman, R. T. Bohn. Secretary, Walter A. Maclinn, Dept. of Food Technology, N. J. Agricultural Experiment Station, New Brunswick, N. J. Councilors: R. T. Bohn, J. H. Nair, S. L. Galvin, Ira D. Garard.

FLORIDA, No. 7: Chairman, F. W. Wenzel. Secretary, Roger Patrick, P. O. Box 403, Winter Haven, Fla. Councilor, V. C. Praschan.

WESTERN NEW YORK, No. 8: Chairman, David B. Hand. Secretary, W. S. Conway, Jr., Richardson Corp., 1069 Lyell Ave., Rochester 13, N. Y. Councilor, W. D. Pheteplace, Jr.

GREAT LAKES, No. 9: Chairman, M. W. Alderman. Secretary, Pauline Paul, 114 Home Economics, Michigan State College, East Lansing, Mich. Councilors, R. E. Marshall, J. C. Sanford.

PHILADELPHIA, No. 10: Chairman, W. L. Obold. Secretary, John L. Barnhart, Temple University, 1808 Spring Garden St., Philadelphia, Pa. Councilors, R. G. Foster, R. A. Pouchain.

MARYLAND, No. 11: Chairman, Amihud Kramer. Secretary, Edgar G. Heyl, 9 W. Chase St., Baltimore 1, Md. Councilors, A. H. Warth, Maurice Seigel.

PUGET SOUND, No. 12: Chairman, T. L. Swenson. Secretary, Glenn M. Danielson, Nalley's Inc., 409 Puyallup Ave., Tacoma 1, Wash. Councilor, Charles R. Stumbo.

AMES, No. 13: Chairman, E. W. Eickelberg. Secretary, Frances Carlin, Agr. Exp. Station, Iowa State College, Ames, Iowa. Councilor, George F. Stewart.

MOHAWK VALLEY, No. 14: Chairman, E. J. Abeling. Secretary, W. G. Vogel, 42 Main St., Fort Plain, N. Y. Councilor, T. P. Svolos.

OHIO VALLEY, No. 15: Chairman, A. J. Glazier. Secretary, Dorothy C. Wilson, Ohio State University, Horticulture Bldg., Columbus 10, Ohio. Councilor, Fred H. Dellwo.

OREGON, No. 16: Chairman, G. A. Richardson. Secretary, C. E. Samuels, Dept. of Food Technology, Oregon State College, Corvallis, Ore. Councilor, E. H. Wiegand.

DIXIE, No. 17: Chairman, R. D. Haynes. Secretary, Robert E. O'Neill, U. S. Food and Drug, 416 New Post Office, Atlanta, Ga. Councilor, J. O. Mundt.

TEXAS, No. 18: Chairman, R. F. Cain. Secretary, A. V. Moore, Dairy Dept., A. & M. College, College Station, Texas. Councilor, W. C. Scott.

AUSTRALIA, No. 19: Chairman, J. R. Vickery. Secretary, V. M. Lewis, 25 Byron St., Coogee, N. S. W., Australia. Councilor, H. G. Jessep.

INDIANA, No. 20: Chairman, L. F. Rutledge. Secretary, G. H. F. Schnakenberg, Eli Lilly and Co., Indianapolis 6, Ind. Councilor, N. W. Desrosier.

PITTSBURGH, No. 21: Chairman, H. H. Mottern. Secretary, John J. Enright, Mellon Institute of Industrial Research, 4400 Fifth Ave., Pittsburgh, Pa. Councilor, H. H. Mottern.

MEMBERSHIP

Write to nearest regional secretary, if within an area covered by a regional section, or to the Executive Secretary of the Institute, for an application form and information regarding qualifications and classifications.

By-Laws

(Continued from page 19)

c. That the organization is recognized as a campus group by the educational institution.

d. That at least one member of the faculty, who is a member of the Institute sponsors the petitioning organization.

e. That the organization has adopted a set of By-Laws not inconsistent with the Constitution and By-Laws of the Institute.

The Council, by this By-Law, authorizes its Executive Committee to approve or disapprove petitions for Student Chapter Certificates.

f. The petition for Certificate shall be signed by at least one sponsor, and shall:

(a) List the names of the members and officers of the organization.

(b) State date of organization.

(c) State dates of last three meetings.

(d) Include a copy of the By-Laws of the organization.

g. One of the sponsoring faculty members shall be appointed by the chairman of the local section as Official Liaison Representative for the chapter. This faculty member's endorsement shall be required on each application for student membership and on each annual renewal of such membership.

ARTICLE IX

General

Section 1. Executive Committee Nomination and Election.

a. The five elected members of the Executive Committee shall be elected from the active members of the Council by the following procedure: At the annual meeting the President-elect shall appoint a Nominating Committee of five Council members, no two of which shall be from the same Regional Section. The Nominating Committee shall meet prior to the close of the Annual Meeting, and shall select from the list of active Council members a slate of not less than seven and not more than ten, no two of which shall be from the same Regional Section. The Nominating Committee shall present to the Executive Secretary the names of the individuals nominated, and the Executive Secretary will then send to each member of the new Council an informal ballot requestting that each Councilor vote for five of the nominees. The five who have received the highest number of votes three weeks after the mailing of the ballot shall be notified that they are members of the Executive Committee and the Council.

b. The five elected Committee members shall continue in office for one year, or until the succeeding Executive Committee shall be declared elected.

c. A member of the Executive Committee may be elected to succeed himself on the Committee, provided he continues as a member of the Council.

Section 2. Executive Committee. Duties and Functions. Except as herein provided or unless specifically authorized by resolution of the Council, all actions of the Executive Committee must be approved by the Council before becoming effective. Immediately following any meeting of the Executive Committee, the Executive Secretary shall prepare the proceedings of the Committee and submit a draft of these proceedings to the President for his approval. Upon his approval copies shall be mailed to all members of the Council with a suitable ballot on which the Councilors may indicate their approval or disapproval of each action taken. Twenty days after the mailing of the proceedings and ballots to the Councilors, the Executive Secretary shall tabulate the results of the voting and transmit this tabulation and the ballots to the President, together with a copy of the proceedings. The President shall certify the approval or disapproval of the Council on the copy of the proceedings and return same to the Executive Secretary for filing in the Book of Minutes of the Institute. A majority of the members of the Council must vote in order to constitute a quorum for the mail ballot of the Council.

ARTICLE X

Any previous action of the Council that is in conflict with these By-Laws is hereby rescinded.

reduce **RANCIDITY...**

increase **SHELF LIFE...**

with

NEW DIAMOND CRYSTAL Antioxidant SALT!

As you know, potato chips, prepared mixes, nuts, baked goods, powdered soups and many other products that are high in fat and low in moisture are often degraded by rancidity and the development of oxidative "off" flavors. And these factors limit the shelf life of many food products.

These problems may be avoided by the proper use of a new food grade antioxidant salt, developed as a result of years of laboratory research—Diamond Crystal Antioxidant Salt!

New Antioxidant Salt is as simple to use as common table salt. If sodium chloride is used in your processing, Antioxidant Salt will fit into your operation without extra equipment or labor.

Antioxidant Salt is economical, too! The additional cost involved in salting potato chips, for instance, is only about 7¢ per 100 lbs. of chips! This is a small cost to minimize returned goods.

The effectiveness, ease of use and economy of Diamond Crystal Antioxidant Salt will more than justify its test in your operation. Samples are available upon request. Send for yours right away! For further information, write to Technical Director, Diamond Crystal-Colonial Salt Division, General Foods Corporation, St. Clair, Michigan.

DIAMOND CRYSTAL Antioxidant SALT

Selected Abstracts

BIOLOGICAL SCIENCES

MICROBIOLOGY

Studies to formulate new media for the standard plate count of dairy products.

Buchbinder, L., Barris, Y., Alff, E., Reynolds, E., Dillon, E., et al. *Public Health Reports, 66,* 327-40 (1951).

Studies are described in which several satisfactory media were found. One type of medium contains Difco Yeast Extract, dextrose, and a peptone or peptone mixture as essential ingredients. Yeast extracts produced by three other companies were found to be unsatisfactory for this purpose. Each of four peptones tested was found to be satisfactory. They were B. B. L. Polypeptone and Trypticase, and Difco Tryptone and Proteose Peptone No. 3. The medium containing B. B. L. Polypeptone was found to produce significantly higher counts than did the one containing Proteose Peptone No. 3. Another apparently satisfactory type of medium contains the plant peptone, B. B. L. Phytone, an animal peptone, and dextrose as essential ingredients. It is shown that manipulation of the amounts of ingredients or substitution or omission of certain ingredients has predictable quantitative effects on the plate count. A short method for testing the statistical significance of the mean difference of logarithms of paired counts is described and illustrated.

Some physical factors that influence the survival of Brucella abortus during freeze-drying.

Hutton, R. S., Hilmoe, R. J., and Roberts, J. L. *J. Bact., 61,* 309-19 (1951).

An experimental freeze-drying apparatus was constructed and used. Temperature of ice film before and during drying and drying rates could be controlled. A critical temperature associated with the salt content of the sample was shown above which recovery of viable cells was lessened. An optimum drying rate was demonstrated. Dryers were correlated with recovery immediately after drying and with storage at room temperature.

NUTRITION

The relation of nutrition to susceptibility to toxic substances.

Shils, M. E. *Am. J. Pub. Health, 41,* 419-23 (1951).

In reviewing the literature and some original work, the following conclusions were drawn: (1) Various deficiency states, especially that of protein and lipotropic compounds, often increases susceptibility to toxic substances. An overall adequate diet is important in industrial situations. (2) The claims for widespread increased requirements of certain nutrients by those exposed to toxic compounds do not rest on firm foundation. With certain harmful substances or irradiation, extra nutrients may be beneficial. (3) Evidence gained with one toxic substance and specific nutrients do not necessarily apply to other toxic substances. (4) Animal experiments to be applied to human beings must be run with conditions similar to those prevailing in industry. The study of effects of mild chronic deficiencies on the susceptibility to toxic agents should be studied.

Thiamine deficiency in the lamb.

Draper, H. H., and Johnson, B. C. *J. Nutr., 43,* 413-22 (1951).

The results obtained in this experiment support the conclusion that thiamine is an essential nutrient for the lamb.

Effects of breakfasts of different size and content on physiologic response of men.

Tuttle, W. W., Daum, K., Imig, C. J., Martin, C., and Kisgen, R. *J. Am. Dietet. Assn., 27,* 190-6 (1951).

Tests conducted on ten healthy men, twenty to thirty-five years old, indicated there was no differentiation in tremor magnitude, choice reaction time, maximum work output, and blood sugar level 3 or 4 hours after breakfast, following the regular consumption of a basic (750 calories) cereal and a basic (750 calories) bacon and egg breakfast. The same relative effect took place when these physiologic responses were compared after the ingestion of a heavy cereal (1200 calories) and a heavy bacon and egg breakfast (1200 calories). In 75% of the cases, however, the men did significantly more work after the regular consumption of the basic breakfasts than after the consumption of the heavy breakfasts, regardless of whether the breakfast contained bacon and eggs or cereal and milk. The average blood sugar levels of the men showed a tendency toward elevation as the size of the breakfast was increased. A breakfast consisting either of cereal and milk or bacon and eggs was equally effective in preventing a hypoglycemic condition in young male adults in the morning hours before noon lunch.

Fat emulsions for oral nutrition. III. Use of orally administered fat emulsions as caloric supplements in man.

Shoshkes, M., VanItallie, T .B., Geyer, R. P., and Stare, F. J. *J. Am. Dietet. Assn., 27,* 197-208 (1951).

Emulsions of 40% peanut oil and 10% dextrose with a caloric value of 4 per milliliter were given to 141 people in need of extra calories. The emulsions were reasonably palatable and were well tolerated. They were readily accepted as dietary supplements by healthy adults and by patients hospitalized for illnesses of an acute and chronic nature. A study of three normal males demonstrated that the nitrogen deficit brought about by a calorically inadequate diet could be corrected by the supplementary administration of the oral fat preparation. Of 33 unselected normal adults needing extra calories, 25 tolerated large amounts of the emulsions easily and showed a weight gain varying from 1 to 11.5 lb. in periods of study ranging from 5 to 63 days. The average rate of gain in this group was 0.1 lb. per day for an average ingestion of 0.1 lb. fat per day from the emulsion. Of 98 unselected patients in need of extra calories 73 easily tolerated large amounts of the emulsion administered by mouth or tube, and displayed weight gain varying from 1 to 22 lb. in periods of study ranging from 5 to 150 days. The average rate of gain observed was 0.2 lb. per day for an average ingestion.

The influence of animal protein factor supplements and antibiotics on the incidence and severity of white feathers in turkeys.

Slinger, S. J., Gartley, K. M., Pepper, W. F., and Hill, D. C. *J. Nutr., 43,* 345-55 (1951).

The inclusion of an APF supplement in a soybean oil meal diet fed to young turkeys resulted in marked improvement in growth and feed efficiency. When this APF supplement was added to a sunflower seed oil meal diet, containing 0.9% lysine, little or no response occurred in growth and feed efficiency. None of the birds fed the soybean oil meal diets developed white feathers, while all the birds fed the sunflower seed oil meal diets showed this condition. The addition of the APF supplement to the sunflower seed oil meal diet increased the severity of the white feather syndrome. The results indicate that certain APF concentrates, penicillin and aureomycin increase the lysine requirement of the poult for normal feather pigmentation. It is also suggested that these materials increase the requirement of this species for other amino acids.

The level of cobalt tolerance in yearling sheep.

Becker, D. E., and Smith, S. E. *J. Animal Sci., 10,* 266-71 (1951).

Levels of cobalt chloride up to 160 mg. per hundred-weight daily can be tolerated for at least eight weeks. 200 to 500 mg. Co/100 wt. daily caused depressed appetite, weight losses and anemia at the higher level. Injection of 75 mg. Co daily resulted in death. Pathological studies of sheep which died of cobalt toxicosis showed fatty infiltration of the liver, slight pulmonary edema and congestion in all cases.

PHYSIOLOGY

Castor bean: an industrial hazard as a contaminant of green coffee dust and used burlap bags.

Figley, K. D., and Rawling, F. F. A. *J. Allergy, 21,* 545 (1950); *Arch. Ind. Hyg., 3,* 419 (1951).

Green coffee beans may be contaminated with castor beans which contain the most potent allergenic fractions known to man. The coffee bean, itself, contains an allergenic fraction that

is stable on autoclaving for 20 minutes at 15 lbs. pressure but is inactivated by the commercial roasting process.

Ability of infants to taste PTC: its application in cases of doubtful paternity.

CARDULLO, H. M., AND HOLT, JR., L. E. *Proc. Soc. Exptl. Biol. Med., 76,* 589-92 (1951).

Phenyl thio carbamide is known to divide population into two groups, those capable of tasting its intense bitterness and those to whom it is tasteless. The capacity for tasting or failing to taste the compound is inherited according to Mendelian laws.

FOOD PRODUCTS

CEREALS AND GRAINS

The chemical composition of some sorghum grains and the properties of their starches.

BARHAM, H. N., WAGONER, J. A., CAMPBELL, C. L., AND HARCLERODE, E. H. *Tech. Bull. Kansas Agric. Exptl. Sta., 61,* 1-47 (1946); *Biol. Abst., 25,* 70, No. 755 (1951).

The varieties of sorghum grains selected for study were: Feterita, Finney milo, Cheyenne, Club, Hegari, Red kafir, Wheatland, Early Sumac, Blackhull kafir, Early Kalo, Atlas, Pink kafir, Leoti Red and Schrock. Each variety of grain was analyzed for moisture, ash, protein, crude fat, crude fiber, reducing sugar, non-reducing sugar, starch, and tannin. No satisfactory correlation was found to exist between any chemical constituent and starch quality. However, there were indications that the protein content of grains of the miscellaneous sorghum varieties was higher than that of the kafir varieties. Also, the crude fiber was higher and the non-reducing sugars lower in the glutinous varieties than in the non-glutinous varieties. Other components had no group significance. The extremes in tannin content were 0.0030 and 0.1667%. Although no correlation was found to exist between the chemical composition of the grains and the behavior of their starches, there was evidence that the varietal factor has an appreciable determining influence upon granule structure. When the starches were arranged according to an index ratio taken from viscosity records, the sorghum grains from which they were prepared, fell into 3 groups which were designated as follows: miscellaneous types, kafir types and glutinous types.

Effects on baking quality of blending durum wheat flour with bread wheat flour.

HARRIS, R. H., AND SIBBITT, L. D. *Baker's Digest, 24,* 61-6 (1950); *Biol. Abst., 25,* 70, No. 749 (1951).

Durum wheat flour did not decrease loaf volume nor change mixing requirements when used in less than 20% concentration in the blend. Above this percentage these factors are impaired. Crumb color tends to be lowered by even small proportions of durum flour, but the decrease is not very noticeable until 20% is added. Water absorption is slightly decreased. Dry milk solids and shortening did not alter the harmful effect of durum flour on crumb color. When English wheat flour was used, durum increased the protein content, and slightly improved absorption, loaf volume and loaf symmetry. Grain, texture, and color were adversely affected, however. Apparently durum wheat flour can be used to some extent in blends with hard red spring wheat flour without damaging baking quality. It can also be used with English low protein wheat flour with beneficial effects on water absorption and loaf volume. Preliminary experiments indicated that the damaging effect on crumb color of low proportions of durum flour could be largely eliminated by bleaching.

EGG PRODUCTS

Dried whole egg powder. XXIX. The effect of high moisture content on fluorescence and other chemical changes.

BOULET, M., AND PEARCE, J. A. *Canadian J. Technol., 29,* 153-8 (1951).

Calculations based on the rate of fluorescence developed in glucose-glycine mixtures indicated that fluorescence development in stored egg powders containing about 8% moisture should be more rapid than in stored powders of higher or lower moisture content. Fluorescence measurements on egg powders adjusted to various moisture levels from 3% to 16% verified this calculation. Rate of decrease of reducing sugar content behaved similarly. Measurements of the decrease in solubility

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of nitrogenous components indicated that this change was not directly related to the reactions that produce fluorescing substances.

Egg white proteins.

CSONKA, F. A., AND JONES, M. A. *Federation Proc., 10,* 176, Mar., 1951.

Differences were observed in the composition of the egg white of the eggs from two genetic lines of hens studied. The major differences observed were in the ovomucoid, conalbumen and globulin content of the eggs and were noted whether the hens were on a diet of relatively low or of relatively high protein content.

FATS AND OILS

Experiments show shelf life of nuts can be increased.

Peanut J., 30, 33, Apr., 1951.

The use of Tenox has proven to be effective in prolonging potato chip shelf life, which indicated it might perform a similar function for nuts. Experiments using Tenox II showed improvements varying with the composition of the cooking oil and the type of nuts. For peanuts cooked in peanut oil, this increase in shelf life was 57%.

Alkyl hydroxyanisoles as antioxidants.

ROSENWALD, R. H., AND CHENICEK, J. A. *J. Am. Oil Chemists' Soc., 28,* 185-8 (1951).

The antioxidant potency of 3-t-butyl-4-hydroxyanisole is more effective in the stabilization of lard and baked goods (soda crackers) than a number of other alkyl substituted hydroxyanisoles.

Autoxidation of drying oils adsorbed on porous solids.

HONN, F. J., BEZMAN, I. I., AND DAUBERT, B. F. *J. Am. Oil Chemists Soc., 28,* 129-33 (1951).

The rate of oxygen uptake of purified soybean oil was determined as a function of the dispersion of the oil on the surface of highly porous silica gel. The most rapid consumption of oxygen took place at well-defined oil/solid ratios characteristic of the specific surface areas of the adsorbents. At these critical concentrations it was shown that the oil constituted a closely packed monomolecular layer. The existence of such critical ratios was regarded as further substantiation of the radical chain mechanism of autoxidation.

The flavor problem of soybean oil. VII. Effect of trace metals.

EVANS, C. D., SCHWAB, A. W., MOSER, H. A., HAWLEY, J. E., AND MELVIN, E. H. *J. Am. Oil Chemists Soc., 28,* 68-73 (1951).

No correlation was found between the metal content and the stability of commercial edible soybean oil. This lack of correlation is attributed to the use of metal deactivators by some processors. A high correlation between stability and metal content has been shown in studies on both lab-refined soybean oils and oils containing added iron and other metals. Different concentrations of copper in soybean oil showed copper to be at least 10 times, but probably less than 100 times, more detrimental than iron. In soybean salad oil, iron was more detrimental than copper when evaluated on the basis of actual amount of metal present in the oil. This was especially true for the oils containing the higher amounts of iron. The copper content was consistent in all oils examined regardless of the source or method of processing. This indicated little contamination from copper-containing equipment, and perhaps the amount of copper present was native to the bean and the oil. All metal contamination is probably detrimental to the stability and quality of soybean oil and the less the contamination, the better the oil. Since oil must be processed in metallic equipment, the amount of contamination that cannot be avoided can be counteracted by the judicious use of metal deactivators.

The flavor problem of soybean oil. VIII. Linolenic acid.

DUTTON, H. J., LANCASTER, C. R., EVANS, C. D., AND COWAN, J. C. *J. Am. Oil Chemists Soc., 28,* 115-18 (1951).

Circumstantial evidence has long pointed to linolenic acid as the unstable precursor of "reversion" flavors in soybean oil. Direct evidence has now been obtained from two sources: a) a qualitative study of the flavors after storage of soybean oil in which the linolenic acid content has been significantly lowered by furfural extraction, and b) organoleptic identification studies of stored soybean oil, stored cottonseed oil, and a cottonseed oil into whose glyceride structure linolenic acid has been introduced with the use of an interesterification catalyst. It is concluded that linolenic acid is an unstable precursor of "fishy-painty-grassy-melony" flavors in soybean oil.

A comparison of several methods for the separation of unsaponifiable material from carnauba and sorghum grain waxes.

BUNGER, W. B., AND KUMMEROW, F. A. *J. Am. Oil Chemists Soc., 28,* 121-3 (1951).

The characteristics of carnauba and four varieties of sorghum grain waxes were compared. The results indicated that sorghum grain wax had higher acetyl, acid, and iodine numbers and a lower saponification number than carnauba wax. Sorghum grain wax also contained a lower percentage of esters and nonsaponifiable material than carnauba wax, and a hydrocarbon fraction which was absent in the latter. Of four methods tested for the quantitative separation of saponifiable and unsaponifiable components, the best separation was obtained by an extraction of the calcium soaps with di-isopropyl ether.

FISH AND SEAFOOD

Utilizing waste fish resulting from the shrimping industry.

BAUGHMAN, J. L. *Fish Meal and Oil Industry, 2,* 9-10, Dec., 1950; *Com. Fisheries Abstracts, 4,* 11, Apr., 1951.

For every lb. of marketable shrimp produced, approximately six lbs. of scrap fish are caught. At the present time, well in excess of one billion lbs. of such fish are shovelled overboard annually, dead, because they are of no commercial value to the fisherman. Many suggested processes in regard to utilization of this waste have been useless because the cost of collecting and processing such a widely dispersed raw material would not support a large processing plant. A new idea is presented whereby boats equipped with macerating machines and refrigerated tanks would collect fish at the shrimping grounds and produce liquid gurry from them as they are taken aboard. This gurry could then be delivered to a central processing plant where meal and oil could be extracted, leaving a high food value stickwater. Essentially, this would reverse the present process where stickwater is the by-product and make meal and oil the by-product of scrap fish stickwater. At present, there is no machinery available for handling scrap fish on board, but until this or some other process is developed, more poundage is going to waste than is taken in the entire menhaden fishery.

Investigation of preservation. III. Heat resistant types of bacteria in canned foods, especially in swelled cans packed with fish and vegetables. IV. The heat resistance of the spores of putrefactive anaerobes, isolated from swelled cans packed with fish and vegetables.

RIEMAN, H. Reports No. 86 and 89 from the Fishery Minister's Research Laboratory, Mar., 1950; *Com. Fisheries Abstracts, 4,* 9, Apr., 1951.

A survey is given of the heat resistant types of bacteria which may be found in canned goods. It is a general experience that the swelling of under-processed canned vegetables and fish in Denmark is due to putrefactive anaerobic bacteria. Fourteen strains of these bacteria were isolated from various quantities of canned fish and vegetables. These samples of canned foods had been given a heat process which normally gives a satisfactory keeping quality. The isolated strains of bacteria mutually showed close relationship and were closely related to *Cl. sporogenes* and to bacterial species isolated from swelled canned goods in other countries.

Canned salmon-cakes.

HARRISON, J. S. M., AND ROACH, S. W. *Fisheries Research Board Canada Pacific Coast Sta. Progress Repts., 86,* 16, Apr., 1951.

Canned fried fish cakes, a by-product of salmon canning are prepared from skinless, boneless chum salmon, boiled rice, corn flour and seasoning, and oil fried before packing six to a 10-ounce can.

FRUIT AND FRUIT JUICES

Experiments with raisin- and grape-syrup.

SEAGRAVE-SMITH, H., AND CRUESS, W. V. *Wines and Vines, 31,* 29-30 (1950); *Biol. Abst., 25,* 715, No. 7634 (1951).

Because of present interest in water white, colorless syrups made by ion exchange treatment of juices, extracts, etc., followed by concentration at low temperatures under high vacuum, experiments reported here were run. Extraction method, equipment changes in composition, in deionizing, concentration, storage tests were explained. A good product was made, but the process is not economical at present. The deionized syrup would compete directly with invert syrup which is supplied adequately by invert syrup made from sucrose. Table syrup from Muscats and Thompson raisins is believed to have greater eventual possibilities than deionized syrup. It is less expensive and simpler to make.

The amino acids present in the protein of the apple fruit.

HULME, A. C. *J. Sci. Food Agric., 2,* 160-6 (1951).

Two protein-containing fractions are obtained from an alkaline phosphate extract of the pulp of young Bramley's Seedling apple fruits and their amino acid constitution determined after hydrolysis, by means of filter-paper chromatography. It is shown that the two protein fractions contain the same twelve amino acids but that aspartic acid is absent from one of the fractions. This fraction does, however, contain an additional acid which has not been identified but which appears, from its position on a two-dimensional chromatogram, to be a basic acid.

Frozen orange juice concentrate.

J. Am. Med. Assoc., 146, 35 (1951).

Frozen concentrated orange juice that contains not less than 40 mg. of vitamin C is eligible for acceptance and use of the seal of The Council on Food and Nutrition of the American Medical Association. The Council indicates that frozen concentrated orange juice (1) can be as valuable in nutritive content as is fresh orange juice, (2) made from properly selected and prepared fruit is a dependable source of vitamin C, and (3) may be useful in the diets of persons of all ages.

The vitamin P content of frozen orange concentrate.

SOKPLOFF, B., AND REDD, J. B. *Proc. Florida State Hort. Soc., 62,* 165-70 (1949); *Biol. Abst., 25,* 419, No. 4448 (1951).

The vitamin P fraction of orange juice, consisting mostly of chalcone hesperidin and glucose-hesperidin, was established after the isolation by chromatographic method, by spectrometric and u.-v. reading. Birds-Eye frozen orange concentrates manufactured in January and February were of relatively low vitamin P content, averaging about 10 mg. of vitamin P in January, and 12.5 mg. in February per 100 ml. of concentrate juice. In March, orange juice showed a sharp increase in the potency reaching its peak in June. An average for March and April was 21.4 mg./100 ml. concentrate while in May and June the potencies of vitamin P were, respectively, 23.0 and 25.0 mg./100 ml. Thus frozen orange concentrate had doubled the amount of vitamin P in May of that manufactured in January, and nearly 3 times more than that in December-January.

INDUSTRIAL CHEMISTRY

Allethrin, a new insecticide.

CONNOLLY, P. J. *Modern Sanit., 2,* 28-30, Dec.; 1950.

Allethrin has been tested for insecticide characteristics and found to have low toxicity to humans, similar to pyrethrins. Moreover it has better initial killing powers, greater physical stability, and better residual action than pyrethrins.

Smoke generators for the dispersion of pesticides.

MARKE, D. J. B., AND LILLY, C. H. *J. Sci. Food Agric., 2,* 56-65 (1951).

The use of self-sustained gas-producing reactions of such materials as ammonium nitrate, guanidine nitrate, and nitroguanidine, with various sensitizers, for the dispersion of benzene hexachloride and other pesticides is described. The optimum mixtures of gas-producing component, sensitizer, and pesticide to give easy initiation, complete propagation, and high volatilization-efficiency have been investigated. A laboratory method

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for the biological assessment of the smoke deposits is given. The particle size, persistence, and settling time of these deposits, their distribution over horizontal, inverted horizontal, and vertical surfaces, and the relative toxicity of different types of surface have been studied. The design for manufacture of smoke generators based on these principles is discussed.

Taint in potatoes grown on land treated with crude benzene hexachloride against wireworms.

JAMESON, H. R., AND TANNER, C. C. *J. Sci. Food Agric., 2,* 171-5 (1951).

It is shown that the degree of taint produced in potatoes grown on land treated (worked into the soil by normal cultivation methods) with crude benzene hexachloride is a function of the amount of crude BHC applied per acre and the time elapsing after application.

PHYSICAL RESEARCH

PHYSICAL CHEMISTRY

The configuration and packing of the chain molecules of native starch as derived from X-ray diffraction of part of a single starch grain.

KREGER, D. R. *Biochim. Biophys. Acta, 6,* 406-25 (1951).

To elucidate the crystal structure of native starch, an X-ray fibre diagram of the substance is indispensable. On account of the smallness of the starch grains and the radial orientation of their crystallites, the usual technics for X-ray diffraction are unsuitable for obtaining such a diagram from the grains. For that purpose, a micro-technic enabling part of a grain to be irradiated by a narrow X-ray pencil is required. By means of a new micro-method for X-ray diffraction, a fibre diagram of a native starch grain could be obtained for the first time from part of a starch grain of the large type occurring in the orchid *Phajus grandifolius.* This result and the conclusions drawn from the diagram were published briefly in earlier papers. The fibre diagram obtained yields conclusive evidence that in starch grains, according to the assumptions made on the basis of their optical behavior, the chain molecules are oriented radially. The powder diagram of *Phajus* starch is almost identical with that of potato starch. Its crystalline modification is therefore the B-modification according to Katz and Van Itallie. It is shown that four different spiral configurations of chains with three α-d-glucose residues per turn can be built up.

Physical chemistry of milk.

KOPACZEWSKI, W. *Lait, 29,* 140-56 (1949); *Chem. Abst., 45,* 1696g (1951).

The mechanism of the separation of the fat from milk is discussed. Fat can be separated from human mother milk by extraction with a fat solvent. The fat emulsion in cow milk is more stable because of its higher protein content in relation to fat and the protective layer around the fat globule must be removed before separation of the fat is possible. A large number of organic and inorganic compounds were tested for their effectiveness in removing the protective layer from the fat globule surface. Some substances, such as isobutyl alcohol, amyl nitrite, Me Et ketone, and chloroform, bring about a gelation accompanied by a strong syneresis of the film protein. Other substances such as acetone, dioxane, tetrahydrofuran, petroleum ether, effect a heterogenous coagulation in 2 phases. A coagulum forms rapidly which settles out and carries with it the fat. A third group of substances, such as CS_2, CCl_4, ethyl acetate and ethylene oxide, remove the fat from the milk with flocculation of the protective layer. The following substances also cause separation of the fat from the milk: KCN, Na_2SO_3, $MgCl_2$, NH_4OH, $NaHSO_3$, ammonium oxalate, and sodium citrate.

PATENTS (U. S. A.)

Process of preparing baked food products.

GREGOR, J. A. Assignor to General Mills, Inc. 2,549,595, Apr. 17, 1951.

The method of preparing baked food products which comprises preparing a dough comprising flour, sugar and water, baking the dough until gelatinization of the starch is complete, adjusting at least one baking condition selected from the group consisting of initial dough temperature, oven temperature, baking time, dough absorption and dough thickness and thereby delaying external browning of the dough until the starch gelatinization is complete, and discontinuing the baking before substantial caramelization of the sugar in the crust takes place.

Cake moistener.

BISHOP, J. P. 2,549,161, Apr. 17, 1951.

A moistener of the class described comprising, a round open top base member adapted for holding water, screw threads around the upper edge of the base member, a second member having a round bottom edge portion with screw threads therein with the upper portion having a surrounding wall hexagonal in shape, a flat panel integral with the top edge of the wall, panel having an oblong slot in the middle portion thereof, wall having an oblong slot in each of three of its hexagonal panels with a blank panel between any two of panels with slots, second member screwed upon the first member, a fabric wick mounted with its upper end held in slot in the top panel of the second member with the bottom end of the wick extended into the base member; a third member substantially cupshaped with its mouth portion being round and its remaining portion being hexagonal in shape and having a plurality of vent-holes in each of three of its panels with a blank panel between and two of panels with vent-holes therein.

Process for the preservation of comestible materials.

TAYLOR, L. D. Assignor to Mathieson Chemical Corp. 2,546,568, Mar. 27, 1951.

A process for the preservation of comestible materials of the non-cereal type and which normally contain high proportions of water whereby contaminating micro-organisms are eliminated without deleteriously affecting the taste, odor and nutritional value of the comestible material, which comprises treating the comestible material with chlorine dioxide.

Process for treating rice.

LANDON, R. W., TALMEY, P., AND GUTZEIT, G. Assignors, by mesne assignments, to M. Yonan-Malek, 2,546,456, Mar. 27, 1951.

The method of preparing paddy rice for milling to produce a high yield of light colored nutrient enriched whole kernels for human consumption which comprises: soaking the paddy in an excess of water at approximately 125° F. for eleven hours at atmospheric pressure to cause it to absorb from 20 to 30% moisture on a wet basis; removing the paddy from the soaking water and removing the entrained water therefrom; steaming the paddy under pressure and at a temperature of approximately 235° F. to gelatinize the starch therein substantially without increase in the water content thereof; and drying the steamed paddy down to a moisture content of from 11 to 15% on a wet basis.

Method of keeping the meat of shellfish in a fresh condition.

BYRD, G. C. 2,546,428, Mar. 27, 1951.

The method of treating the meat of fresh shellfish to keep the same in a fresh condition for varying periods of time, consisting in packing the meat in a suitable container sealed with a minimum of oxygen present therein, heating the contents of the container at a temperature range from 171° F. to a higher point below the boiling point of water without sterilization of the contents of the container, cooling the container, and then subjecting the container to refrigeration until consumed.

Apparatus for shelling shrimp.

ABBOTT, J. C. 2,546,414, Mar. 27, 1951.

A device for shelling shrimp, comprising two endless belts arranged with adjacent reaches adapted to travel in the same direction, reaches positioned in planes angularly disposed with respect to each other both longitudinally of reaches and transversely thereof, whereby reaches constitute a moving trough with the bottom edges of the sides spaced apart a less distance

than the top edges, and bottom edges inclined apart in the direction of travel of reaches, with means located adjacent the bottom edges of the parallel pairs for directing opposed blasts of a fluid medium from opposite sides transversely of and below the bottom edges of belt reaches.

Apparatus for scalding poultry.

DREWS, H. E. Assignor to Barker Poultry Equipment Co. 2,549,070, Apr. 17, 1951.

A poultry scalding means for use with a chain type conveyor having means for hanging poultry therefrom, comprising a chamber comprised of vertical, parallel side walls, inwardly projecting top walls and flexible adjoining end closures to provide a pair of box-like members opening toward each other, spray pipes on the inner walls of the box having openings therein so placed as to direct water discharged from the spray pipes onto the poultry as it passes through the chamber, a main tank below the chamber and means for conducting the water draining from the poultry and the chamber to the tank, means for filtering the water, means for collecting the water, and a pump for recirculating the water through the spray pipes.

Method for treatment of fruit wastes.

NEAL, W. M. Assignor, by Decree of Court, to the State of Florida. 2,548,510, Apr. 10, 1951.

A method for the prevention of "balling" or "case hardening" during evaporation of water from citrous fruit waste containing colloidal constituents which comprises grinding the fruit waste material to suitably comminute the same, adding to the ground material a reactive non-toxic calcium compound to break up the gel structure of constituents, aging the resulting mass to agglomerate colloidal constituents thereof, mechanically removing water from the mass and evaporating remaining moisture in the mass by means of heat to obtain a product having less than 15% of moisture.

Method and apparatus for drying gelatinous material.

PECK, H. E. Assignor to McBean Research Corp. 2,546,867, Mar. 27, 1951.

The method of producing gelatinous material which comprises cooling a solution of the material to the jelling point of the solution in a completely enclosed chamber from which air is excluded while agitating the solution to prevent it from jelling, forcing the sub-cooled solution into an enlarged chamber from which air is also excluded, allowing the solution to jell in enlarged chamber, then extruding the jell from the chamber in ribbons collecting the extruded material and passing heated air depthwise through the material to dry the material. The method of drying gelatinous material which comprises cooling a solution of the material to the jelling point of the solution while agitating the solution to prevent it from gelling, forcing the sub-cooled solution into an enlarged chamber to permit it to jell, extruding the jelled material in ribbons, collecting the extruded material on a traveling foraminous conveyor, passing heated air repeatedly through the material depthwise of the material as it moves along with the conveyor, and raising the temperature of the air after each passage through the material prior to the next passage of the air through the material, the air being passed down through the material at least on its first passage through the material and the air being passed up through the material at least on its last passage through the material.

Fungicide.

KIFF, B. W. Assignor, to Union Carbide and Carbon Corp. 2,540,171, Feb. 6, 1951.

A concentrate adapted to be made into a spray for combating plant pests by the addition of water and an alkaline material, comprising a mixture of glyoxalidine salt of an aliphatic, monocarboxylic acid and a member of the group consisting of alcoholysis and hydrolysis products thereof, in solution in an alcohol, there being a larger proportion of the salt than of a member of said group, the organic acid having from 2 to 8 carbon atoms, the alcohol being a monohydric, acyclic saturated alcohol having from 1 to 4 carbon atoms inclusive.

Composition for and method of inhibiting fungi.

LAW, G. H., AND WELLMAN, R. H. Assignors, to Union Carbide and Carbon Corp. 2,540,170, Feb. 6, 1951.

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Abstracts

Method of inhibiting fungi which comprises applying to a host a fungicidal composition comprising, as an active fungicidal ingredient, a substituted glyoxalidine having a saturated 17 carbon atom aliphatic group connected directly to the carbon atom at the 2 position in the glyoxalidine ring, and a diluent, the composition containing undissolved glyoxalidine and having a phytotoxic activity no greater than that corresponding to a dispersion of 10 parts by weight of 1-hydroxyethyl-2-heptadecyl glyoxalidine in 1000 parts by weight of water.

Noncurding bigh calcium milk product and method of producing same.

BAUR, L. S., AND GERBER, M. P. Assignors to M & R Dietetic Labs. Inc. 2,541,568, Feb. 13, 1951.

In the preparation of a dried non-curd forming dietary milk product having an increased calcium to phosphorus ratio over that of normal cow's milk, the method which comprises adding to a known quantity of cow's milk having a known calcium to phosphorus ratio an edible compound containing calcium ions sufficient to raise the calcium to phosphorus ratio of the treated milk to a value of from 1.3 to 1, to 2.43 to 1, introducing within the milk a non-toxic compound containing citrate ions sufficient to completely destroy curd-forming properties within the treated milk, adding to the thus treated milk a mixture of animal and vegetable fats, dissolving in the milk, crystalline lactose, condensing the milk, and mechanically drying the condensed milk to produce a dried milk product.

Method of preserving spray dried food products.

SHARP, P. F., AND WASSON, A. J. Assignors to Golden State Co., Ltd. 2,541,441, Feb. 13, 1951.

The method of packaging spray dried powdered milk having air associated therewith both between the particles of powdered milk and in the interior of particles so as to reduce the oxygen content of powdered milk, which method comprises the steps of, introducing the powdered milk into a confined space to form a bulk mass therein, displacing the air between particles in space with inert gas, whereby the inert gas diffuses into the interior of the particles to replace oxygen therein and the replaced oxygen diffuses into the inert gas between the particles to increase the oxygen content of the inert gas between particles, further displacing the gas between patricles with fresh inert gas to cause further diffusion and replacement of oxygen with inert gas in the interior of particles while discharging the displaced gas from space, continuing the further displacement of the gas between the particles with fresh inert gas and the discharge of displaced gas from space at least until the oxygen content of the discharged gas is reduced to between approximately 1 and 3% when calculated relative to a discharge flow of .01 to 15 cubic ft. per hr. per 100 lbs. of powdered milk, and thereafter removing the resulting powdered milk from space and packaging the same in sealed packages under non-oxidizing conditions.

Process for canning and sterilizing food products.

SMITH, JR., H. L., AND BALL, C. O. Assignors, by direct and mesne assignments, to Food Processes, Inc. 2,541,113, Feb. 13, 1951.

A process for canning and sterilizing a food product which comprises rapidly heating the entire product in bulk under sufficient superatmospheric pressure to prevent boiling of the liquid content thereof to a maximum temperature above the atmospheric boiling point of the liquid, rapidly cooling the product in bulk from such maximum temperature to a filling temperature above the atmospheric boiling point of the product liquid, such heating and cooling comprising a heat treatment from 50 to 97% as great as that required for complete sterilization of the product, filling and sealing the so treated product while under superatmospheric pressure above the boiling point of the product liquid at the filling temperature in containers sterilized to substantially the same degree as the product filled therein, and holding the filled and sealed containers under such superatmospheric pressure and approximately at such filling temperature for an interval sufficient to complete the sterilization of the product and the containers.

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Apparatus for cooling granular solids.

GREISEN, E. C. Assignor to Allis Chalmers Manufacturing Co. 2,543,776, Mar. 6, 1951.

Air quenching apparatus for hot granular materials comprising a rotatable drum, means to rotate drum at a rate such that granular materials received therein will form a well defined tumbling stream confined substantially to a lower quadrant thereof, a stationary air duct extending into the material receiving end of drum and throughout a substantial portion of the length in spaced relation to the inner surface of drum, duct having nozzles directed toward the exposed surface of stream, a material introducing chute passing from outside drum obliquely downward through duct to the space below duct and within drum, air circulating means operatively connected to duct and drum to induce a current of cooling air into duct around the chute and through nozzles into the interior of drum, and means to discharge materials from drum.

Regional Section News

(Continued from page 12 preceding technical papers)

University, Geneva, N. Y., has been appointed to the headship of the Stability Division of the Quartermaster Food and Container Institute of the Armed Forces, Chicago, Illinois.

VIRGIL O. WODICKA has been appointed Assistant to the Scientific Director at the Quartermaster Food and Container Institute of the Armed Forces, Chicago, Ill. Mr. Wodicka is Chairman-elect and Section Councilor of the Chicago Section of the IFT. He was recently with Libby, McNeill and Libby, Blue Island, Ill., and previously he was Manager of the Cereal Laboratories of Ralston-Purina, St. Louis, Mo. During World War II he served at the QM Subsistence Research and Development Laboratory and returned to civilian life in 1945 with the reserve rank of Lieutenant Colonel.

FAO MOVING TO PERMANENT SEAT IN ROME

The removal of the temporary headquarters of the Food and Agricultural Organization of the United Nations from Washington, D. C., to Rome, Italy, takes place during the months of February, March, and April 1951. First of the new specialized United Nations agencies created after the war, FAO has made its temporary home in Washington since its founding in October 1945, when 44 nations agreed to work together to help solve world food and agriculture problems. Following the vote of the 1949 conference to establish permanent headquarters in Rome, FAO began immediately to work on the complex task of transferring and housing the staff and their families, and of moving organization archives with a minimum of interruption in its world-wide activities. Of a staff of 600, about 200 are moving. Clerical and maintainance staff will be replaced largely by local employees in Rome.

FAO moves into a building provided by the Italian government in the ancient part of Rome, alongside the Circus Maximus, not far from the Coliseum. A second building, adjoining the first, will be completed later this year, and will include additional FAO offices, a conference room with modern equipment and facilities, and an expanded FAO library. The library will include thousands of volumes from the former International Institute of Agriculture at Rome, making the combined library one of the largest in the world on agricultural subjects.

The new address of FAO in Rome is: Viale delle Terme di Caracalla, Rome, Italy.

ATLANTIC COAST MACKEREL PURSE SEINE

Mackerel *(Scomber scombrus)* is one of the most important food fishes caught along the Eastern Coast of the United States, with the average annual production amounting to about 35,000,000 pounds. There are approximately 100 vessels and 1,000 fishermen participating in the catching of these fish. In general, the mackerel season begins late March, or early April, in the Chesapeake Bay area, and as the season advances, catches are made further north along the Atlantic Coast. June and July find the mackerel in the Gulf of Maine and as far north as Nova Scotia and Newfoundland. The mackerel schools begin to break up in September but occasionally some reappear off Cape Cod where a few may be taken as late as December. The fish then disappear until the following spring when they repeat the same cycle. — [Fishery Leaflet 373, from *Comm. Fisheries Rev.*, **13** (3) 5 (1951.].

CITRIC ACID IN THE U. S. A.

In the past twenty years the amount of American citric acid produced by sugar fermentation has risen from 10 to 35 million pounds a year, in addition to which some 2 or 3 million pounds are obtained annually from citrus fruit wastes, using the traditional process. Nevertheless, the demand for the acid continues to grow. It is still used principally in the food and beverage industry, but is growing medicinal and other industrial uses are not insignificant.

Well over 90% of the U. S. production is based upon the original tray fermentation method. This involves filling and emptying many hundreds of small trays, and the trays themselves represent a big and rapidly depreciating capital charge. It is not surprising, therefore, to learn that the deep fermentation methods developed for antibiotic production (e.g. penicillin) are being tried out in this particular production.

The principal problem is to keep the organism, *Aspergillus niger*, liberally supplied with air; for deep fermentation, air is constantly bubbled through the molasses-sugar solution. Pilot experiments with deep fermentation were successful, but in these pure sugar solutions were used; the conversion efficiency was hopelessly low when the normal solutions based upon waste molasses were used.

These difficulties are now said to have been overcome. With new manufacturers using the deep fermentation method and with expansions in the tray fermentation output, it is estimated that annual production of citric acid in America may rise to 50 million pounds by the end of 1951. Even so, it is not anticipated that the market will be flooded.—[An editorial in *Food Manufacture*, **26**, 133, (April 1) 1951.].

EMPLOYMENT NOTICES

CHEMIST—Food products—a firm with triple A1 rating located in Chicago, interested in manufacturing of flavoring ingredients used by food processing companies, requires the services of a Chemist primarily for research and development work. Preference will be given to a man who has done important work in connection with development or improvement of flavors for food products with national distribution.

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POSITION WANTED: Food Technologist, college grad., with supervisory experience in quality control and production, freezing and canning, wishes to make change to food concern located in Boston or vicinity. REPLY BOX 159, Institute of Food Technologists, 176 W. Adams St., Chicago 3, Ill.

AVAILABLE; Food Technologist with 25 years experience in wine making, brewing, soft drinks mfg., and sugar and alcohol industries. Some experience in agricultural research. Interested mainly in directing production as winemaker, plant manager or position of similar responsibility. Reply Box 160 Institute of Food Technologists, 176 West Adams St., Chicago 3, Ill.

WANTED: SALES MANAGER for food industry division of large industrial instrument manufacturer. Must have engineering background and comprehensive experience either in food processing or in the sale of process equipment to the food industry. Work involves directing sales and promotional activities with some field contact of major equipment manufacturers and food processors. Salaried position. Location Philadelphia. Replies will be considered confidential and should include complete resumé of personal qualifications, work experience and salary expected. REPLY BOX 156, Institute of Food Technologists, 176 W. Adams St., Chicago 3, Ill.

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REPORT ON THE CURING OF FISHERY PRODUCTS AVAILABLE

Fish curing is an important method of preservation in the fishing industry and in the trade generally, but information on the principles involved in the salting and smoking of fish commercially is widely scattered. A recent report by Norman D. Jarvis of the Fish and Wildlife Service of the U. S. Department of the Interior deals with the "Curing of Fishery Products."

This 272 page survey, available for sixty cents from the Government Printing Office, Washington, 25, D. C., is exceptionally well organized and contains a wealth of information for all those who are in any manner concerned with the curing of fishery products. The report includes discussions of the history of fish curing, the various methods of drying and curing, the methods of salting, the factors involved in spoilage, and a great many other pertinent topics. The booklet contains 39 excellent illustrations, seven pages of references and a good index. (ZIK)

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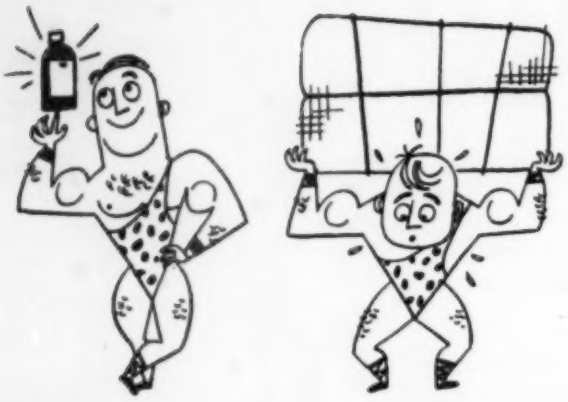

● Samson made an unshakable place for himself in history by hefting mighty objects, and strong men the world over have since labored to emulate him. But the modern food processor and manufacturer of dry and liquid seasonings is seldom naturally equipped for such activity. Therefore to transport and store the heavy, awkward bags of spices his products require, he must perforce hire warehouses, trucks and several muscular, 20th century Samsons!

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FISHERIES OF FRANCE

An important fact in France's high level of fisheries production during 1948 and 1949 was the reconstruction and modernization of the French fleet that was undertaken immediately after World War II and is now nearing completion.

At present, problems of production are considered by the fishery trade to be secondary to the problems of marketing. Considerable attention has been given to improving transportation facilities, especially by expanding the use of refrigeration and to stimulating the demand for fish by propaganda and educational methods.

The production of canned fish has been increasing steadily in recent years. The supply of raw materials, that continued to limit operation for several years after the war, is no longer a critical problem.

Considerable progress is being made in France in the utilization of fish rejected for consumption purposes or otherwise wasted, by processing it into meal and oil. There is still much to be done in the field, however, and it is estimated that at present only 20 to 30 percent of the fish available for processing is so used. [Fisheries Leaflet 381, from *Commercial Fisheries Review*, **13** (5) 57 (1951)].

FUTURE DATES FOR FOOD TECHNOLOGISTS

1951

Oct. 1-3	Association of Official Agricultural Chemists. Shoreham Hotel, Washington, D. C.
Oct. 1-4	Society of Industrial Packaging and Material Handling Engineers, Annual Exposition, Cleveland, Ohio.
Oct. 8-10	American Oil Chemists' Society, Fall Meeting, Chicago, Ill.
Oct. 14-17	American Bakers' Association, Chicago, Ill.
Oct. 14-19	World Metallurgical Congress, Detroit, Mich.
Oct. 22-24	Packaging Institute, 13th Annual Forum, Hotel Commodore, New York, N. Y.
Oct. 24-26	National Pickle Packers Association, Annual Meeting, Sheraton Hotel, Chicago, Ill.
Nov. 5-8	Refrigeration and Air Conditioning Exposition, Navy Pier, Chicago, Ill.
Nov. 12-14	Grocery Manufacturers of America, Inc. Annual Meeting, New York, N. Y.
Nov. 12-15	American Bottlers of Carbonated Beverages. Annual Meeting. Armory, Washington, D. C.

1952

Jan. 16-18	Canadian Food Processors Association, Annual Convention, Chateau Frontenac, Quebec, P. Q.
Jan. 17-18	National Pickle Packers Association, Winter Meeting, Roosevelt Hotel, New York, N. Y.
Jan. 19-23	Conventions of the National Canners Association, National Food Brokers Association, and Canning Machinery and Supplies Association, Atlantic City, N. J.
March 3-7	National Association of Frozen Food Packers, Hotel Stevens, Chicago, Ill.
June 8-12	**Institute of Food Technologists, Twelfth Annual Meeting, Grand Rapids, Mich.**

(Information concerning future dates of national and international meetings, conventions and exhibits of interest to food technologists should be sent to the editorial office.)

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The Institute of Food Technologists assumes no responsibility for statements in contributed articles appearing in FOOD TECHNOLOGY. Editorials present only opinions of the writers and do not necessarily reflect policies of the Institute of Food Technologists.

News of the Institute

COMMITTEE CHAIRMEN ANNOUNCED FOR 1952 ANNUAL MEETING OF THE IFT

General Chairman: Ray B. Wakefield.
Hotel Arrangements Committee: Matt K. Alderman.
Canadian Publicity: T. B. Calder.
Exhibit Committee Chairman: Karl Envoldsen.
Entertainment and Field Trips: Fred Fabian.
Publicity and Printing: Parker Frisselle.
Program Committee Chairman: Roy E. Marshall.
Ladies' Entertainment: Edna Mae McIntosh.
Finance Committee Chairman: Lewis J. Minor.
Registration Committee Chairman: William F. Robertson.
Courtesy Committee Chairman: H. C. Scott.

Regional Section News

GREAT LAKES SECTION

Officers of the Great Lakes Section for 1951-52 are:

Chairman: Matt Alderman, Post Products, Battle Creek, Mich.
Vice Chairman: L. J. Minor, Huron Milling Co., Harbor Beach, Mich.
Secretary: Pauline Paul, Department of Home Economics, Michigan State College, East Lansing, Mich.
Treasurer: W. L. Thompson, Baker Laboratories, Cleveland, Ohio.
Councillors: R. E. Marshall, Michigan State College, East Lansing, Mich.; J. C. Sanford, Basic Food Products, Vermillion, Ohio.

The first section meeting of the year will be held in St. Clair, Mich., on October 19.

NORTHERN CALIFORNIA SECTION

The October meeting of the Section is slated for the 11th. It is also announced that the Section's annual meeting will be held on December 6 at the Western Regional Research Laboratory in Albany.

PERSONNEL

HATTON B. ROGERS, JR., formerly Director of Quality Control, Phillips Packing Co., Cambridge, Maryland, has joined the Technical Service Department of The Huron Milling Company and will make his headquarters at the Company's General Sales Office in New York City. Mr. Rogers attended school at the University of Florida, University of Maryland and George Washington University. For two and a half years prior to service with the armed forces, he was associated with the National Canners Association Research Foundation, Washington, D. C. During the past war he was with the Food and Container Research Institute for the Armed Forces as Chief of the Canned Fruit and Vegetable Section.

G. FRED SOMERS has been appointed Associate Director of the University of Delaware Agricultural Experiment Station at Newark, Del. For the past several years Dr. Somers has been Assistant Director of the U. S. Plant, Soil, and Nutrition Laboratory and Associate Professor of Biochemistry at Cornell University, both at Ithaca, N. Y.

"EGG WHITE" FROM OFFAL

After years of research Norwegian chemists claim to have discovered a satisfactory way of producing "egg white" or albumen from fish offal. The Oslo newspaper Verdens Gang reports that trial production has begun.

Before the war the Germans were producing such a product but it was not sufficiently pure to win favour on the world market, in competition with "egg white" produced from milk, groundnuts, coconuts, soyabeans, and so on. The German product tasted and smelt too much of fish.

The pure Norwegian product now achieved is the result of co-operation between two firms, E. O. Collett and Co. of Oslo and Astrup and Co. of Kristiansund (says the Norwegian Information Service). Trial production is at a rate of over 600 lbs. of dried "egg white" a day, equal to the daily output of 100,000 hens.

The production of 1 lb. of "dried egg white" requires 10-12 lbs. of fish waste, mostly cod. Production is carried out by a completely chemical-mechanical process. From the time the fish enters the pipeline at one end of the factory until it finally emerges at the other end in the form of a dry white powder, it is not touched by hand.

A $\frac{1}{30}$th part of an ounce of powder is sufficient to product three pints of "froth." In several aspects the artificial "egg white" is claimed to be better than natural egg white. A provisional price of 5 to 7 shillings a lb. has been indicated. One pound's weight of the artificial egg white is equivalent to that contained in almost 150 hen's eggs.

The product contains 80 to 90% pure protein, and can be used for baking, ice-cream, puddings, fromage, soup powder, mayonnaise, pharmaceutical products, and so on. It can also be used industrially in the paint and varnish industry, in the textile industry, and also for paper cosmetics, and soap. For industrial use a less refined product would be needed and the price would be correspondingly reduced. [From *Food Technology in Australia*, **3** (4) 94 (1951)].

BOOKLET ON WEED CONTROL PUBLISHED BY FAO

Like death and taxes, weeds are universal blights. Their control is an agricultural problem of great importance, and because of recent developments in weed-killers, the Food and Agricultural Organization of the U. N. has just published a booklet called "Weed Control by Growth-Regulating Substances." Simple and concise, this convenient guide discusses all aspects of the subject: dosage, methods and time of application, influence of weather and soil, effect on animals and humans, and so forth.

The booklet may be obtained for 50c from the Columbia University Press, 2960 Broadway, New York 27, N. Y.

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RESEARCH ON SESAME SEED AND OIL

Extensive basic and technological data on sesame seed and oil have been reported in 10 technical articles since January 1951 by chemists of the U. S. Department of Agriculture. This information will be of value to oilseed processors in the Cotton Belt in the event the crop is grown on a large scale as a supplement or alternate raw material for cottonseed.

The data are the result of investigations at the Southern Regional Research Laboratory in New Orleans, Louisiana. The work was part of a broad program of research being conducted by Department agencies and State Agricultural Experiment Stations to develop varieties of sesame better suited to American farming, and to obtain increased knowledge of the chemical composition and characteristics of the seed.

Sesame seed and oil are well-known commodities in international trade and quantities of both are imported into this country. But the seed has not been produced extensively here, mainly because of harvesting difficulties, some of which are being met through the development of nonshattering varieties. Under good cultural practices the crop yields 800 pounds or more of seed per acre and more oil per acre than any other annual oilseed crop: per 100 pounds of seed 47 pounds of an edible oil equal or superior in quality to cottonseed and peanut oils.

Besides being rich in oil, sesame seed yields a meal which is a nutritious stockfeed, containing 44-45 percent of high quality protein. Also, the seed has superior qualities from the standpoint of the processor—it requires no preparation other than cleaning before milling and it is easily processed in conventional oil milling equipment.

In Southern Laboratory research, oil was recovered from 4 varieties of seed by batch solvent extraction; physical and chemical analyses were made; and each oil was evaluated for use as a salad and cooking oil and for the production of shortening. The crude oil was low in free fatty acids; very light in color; had low refining losses; and bleached well. Hardened to shortening consistency the product showed great stability toward oxidative rancidity. This superior stability was shown to be due to sesamol, a unique component of the seed. A method for determining the free and bound sesamol was developed. Also worked out was a method of determining the amount of seamin, another unique minor component of sesame oil.

The publications are entitled: Properties of a solvent-extracted sesame oil; Some chemical and physical properties of the oils from different varieties of sesame seed; Antioxidant properties of sesamol; Determination of free and bound sesamol; The stability of sesame oil; Determination of sesamin; Optical rotation and the minor components of sesame oil; The chemical and physiological properties of sesame oil; Some physical and chemical properties of sesame protein; Sesame—a new crop for the South.

Reprints of the articles may be obtained by writing the Southern Regional Research Laboratory, 2100 Robert E. Lee Boulevard, New Orleans 19, Louisiana.

GUIDE FOR NUTRIENTS IN FOOD PUBLISHED BY THE U. S. D. A.

An eight-page leaflet entitled "Food Values in Common Portions" prepared by the Bureau of Human Nutrition and Home Economics, aims to serve as a compact, handy guide to composition of familiar food items.

The leaflet gives average values of food energy, protein, fat, carbohydrate, calcium, iron, vitamin A value, thiamine, riboflavin, niacin, ascorbic acid, and water. The leaflet shows for comparison the National Research Council's table of recommended daily dietary allowances, popularly known as the nutrition yardstick.

The new leaflet is adapted from the 147-page technical publication, "Composition of Foods — Raw, Processed, Prepared," which the Bureau issued in 1950, as an aid to research scientists and nutritionists requiring comprehensive data for diet calculations.

Some figures have been rounded off to simplify the data and for quick reference use in comparing nutritive values of foods and estimating nutritive values of diets. From the 751 food items dealt with in the comprehensive publication, 284 have been selected for inclusion in the leaflet.

The leaflet may be bought at 5 cents a copy from the Superintendent of Documents, Washington 25, D. C.

Teachers, leaders of workshops on nutrition, health, or institutional feeding, and others wanting quantity supply of the leaflet are allowed a 25% discount on orders of 100 or more copies.

COMMERCIAL SALMON TROLLING

Troll fishing on the Pacific Coast essentially involves the use of a moving lure or baited hook at a desired depth in the water. *Commercial Salmon Trolling*, Fishery Leaflet, 387, recently issued by the Service's Branch of Commercial Fisheries, explains the gear and methods used in the Pacific Coast commercial salmon troll fishery. This 8-page illustrated publication describes the main trolling line, the leaders, bait and baiting, use of stabilizers, and actual fishing operations. Illustrations accompany many of the descriptions.

In the fifty years following the discovery that king or chinook and silver or coho salmon would strike a moving lure or bait, the troll fishery has developed into one of the most extensive fisheries on the Pacific Coast. It now extends from central California to southeastern Alaska, and during recent years has involved as many as 3,400 United States trolling craft.

Commercial trolling craft vary considerably in size and design, but the usual length is from 30 to 60 feet. Whereas the earlier craft were generally of double-end design, i.e., both bow and stern pointed, the recent trend has been toward the horseshoe-type stern. Irrespective of size and design, however, a trolling craft can always be identified by the long upright poles which are used to keep the lines clear of the boat.

Free copies of Fishery Leaflet 387 are available upon request from the Division of Information, U. S. Fish and Wildlife Service, Washington 25, D. C.

Who's that at the operator's elbow?

The man at the operator's elbow symbolizes a service familiar to every customer of Canco . . .

. . . advice on heat sterilizing processes which Canco Research gives food packers.

This service includes recommendations on such things as correct processing times and temperatures, retort piping systems, and retort venting schedules.

Also, American Can Company Research has helped canners develop new products, improved formulas for present products, and advanced packing methods.

If *you* are a customer of Canco, you *know* how valuable this service can be. You also know that it is only *one* of the many, many services which Canco offers.

HERE ARE A FEW OTHERS:

1. **Advice on crop production problems.**
2. **Prompt help on technical and engineering production problems.**
3. **Advice on label design and information.**
4. **Advice on recipes and consumer preference.**

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Selected Abstracts[a]

ANALYTICAL METHODS

The isolation of a toxic substance from agenized wheat flour.

CAMPBELL, P. N., WORK, T. S., AND MELLANBY, E. *Biochem. J., 48,* 106-13 (1951).

The probable identity of this substance with a substance having similar physiol. properties from agenized zein is indicated. The toxic substance was isolated from an acid hydrolysate of the gluten fraction of flour and is regarded as part of a flour protein. Large-scale partition chromatography on paper-pulp columns was developed as a method of fractionation of complex mixts. Degradation expts. suggested that the toxic substance was a deriv. of methionine. The probable structure is given. Methionine peptides treated with nitrogen trichloride did not give rise to the toxic substance.

FOOD PRODUCTS

BAKING AND BAKERY PRODUCTS

Some effects of soluble flour components on baking behavior.

PENCE, J. W., ELDER, A. H., AND MECHAM, D. K. *Cereal Chem., 28,* 94-104 (1951).

The sol. components of the flours were found to be required for max. performance of all the glutens except that from a durum wheat. Less variation was found among unsupplemented glutens than among glutens supplemented with sols. from a single flour or among sols. used with a single gluten. The sol. components thus appear capable of affecting flour behavior to such an extent that differences or similarities in gluten characteristics may be obscured.

Effect of emulsifiers on the enzyme susceptibility of starch during staling of bread.

VOLZ, F. E., AND RAMSTAD, P. E. *Cereal Chem., 28,* 118-22 (1951).

Enzyme susceptibility of starch in bread crumb may be detd. by digestion with takadiastase. Marked decreases in enzyme susceptibility occur as bread stales. Addn. of polyoxyethylene monostearate or fatty acid monoglycerides (at 0.5% of flour wt.) to bread decreased firmness of the crumb, but had no effect upon the initial enzyme susceptibility of the starch one hr. after baking or the rate at which this decreased as the bread aged.

COFFEE AND COCOA

Adulterated green coffee beans.

Food Drug Cosm. Law Repts., No. 75, 7966-8, May 4, 1951.

Green coffee beans are food within the statutory definition of the Federal Food, Drug, and Cosmetic Act, though a further process-roasting is necessary before they are intended for human consumption, according to a holding in consolidated appeals of three libel actions charging that certain quantities of green coffee beans contg. dust, wood splinters, and foreign substances were adulterated food. Food need not be ready for consumption to be subject to condemnation as adulterated, and adulterated food may be condemned even though the adulteration would be eliminated by a future process. The trial court's provision for salvage of the coffee under supervision of the Federal Security Agency was held to be correct, there being no authority under the Act to permit exportation of the beans after condemnation.

Storage of cocoa powders.

CLARKE, W. P. *Candy Industry,* Apr. 10, 1951; *Refri. Res. Found., Inf. Bull.,* 51-5, 7, May 18, 1951.

Storage conditions for cocoa powders are as follows: Cocoa powder absorbs moisture from air in proportion to its content of cocoa butter—the higher the butter or fat, the less moisture absorbed. Fat-free powder absorbs moisture from air rapidly and in relatively large quantities. Alkali-process cocoa powders are even more hygroscopic than natural powders. They hold more moisture after reaching equil. at any given relative humidity than natural cocoa of the same fat content. The temp. range of 50° to 70° F. is satisfactory. High humidity and high temp. must be strictly avoided. Temp. should fluctuate as little as possible. Air in the powder amts. to about 3 to 6 times the solids—thus variations in temp. may cause expulsion of dry air and return of more moist air, resulting in excessive moisture content, caking, possible off flavors. Excessive temps. may cause "bloom" and subsequent gray color as in chocolate coatings. Five-ply Kraft bags and paper lined wooden and cardboard drums are commonly used packages.

FATS AND OILS

Color in margarine. I. Evaluation of color using the Lovibond tintometer.

BRABANT-SMITH, A. M. K. *Can. J. Technol., 29,* 290-5 (1951).

The precision of color measurements, made on four brands of margarine whose color was in the vicinity of 1.6 Lovibond units of yellow and red together, was detd. A series of readings of duplicate samples of each of the margarines was made by a panel of 12 members, using a B. D. H. pattern Lovibond tintometer, and the results were subjected to statistical analysis. Observational error and individual bias both proved to be large, their net effect being to limit the accuracy of the method to ± 0.5 Lovibond units. Temp. variations also caused perceptible color changes.

Color in margarine. II. An indirect method for measurement of color in terms of the Lovibond color system.

BRABANT-SMITH, A. M. K. *Can. J. Technol., 29,* 296-302 (1951).

A three filter photoelec. reflectometer has been adapted to measure the color of margarine. From the results so obtained the chromaticity co-ordinates can be calcd. and these co-ordinates converted to Lovibond units. A technic for measurement of the color of margarine is described.

Color in margarine. III. Effect of storage conditions.

BRABANT-SMITH, A. M. K. *Can. J. Technol., 29,* 303-9 (1951).

Changes in the color of margarine brought about by storage for various lengths of time at different temps. were studied. The relationship between type of wrapper and brand of margarine was also investigated. No important color changes were observed except where parchment wrapping was employed. In this case a general increase in color occurred owing to surface dehydration of the margarine. Exposure of wrapped margarine to ultraviolet irradiation and to atms. of oxygen or nitrogen had no perceptible effect.

Solvent extraction. IV. The effect of temperature on extraction rate.

WINGARD, M. R., AND PHILLIPS, R. C. *J. Am. Oil Chemists Soc., 28,* 149-52 (1951).

The temp. has a considerable effect on the rate of extn. of crude oils from vegetable oil seeds with solvents. Quant. data have been presented relating extn. rate and temp. for soybeans, cottonseed, and flaxseed extd. with several solvents. These data were obtained by the Percolation Method, modified where necessary. Since no satisfactory theoretical basis for correlation could be established, the results were correlated empirically. For all practical purposes the time in mins. required to reduce the oil seed to 1.0% residual oil content on a dry basis varied inversely with the sq. of the extn. temp. in degrees Fahrenheit.

Butter fat content of cow's milk. A. Seasonal fluctuations in the butter fat content. B. The effect of feeding whole citrus fruit and some of its parts on the fat percent.

(Continued on page 12)

[a] These Selected Abstracts are made available to FOOD TECHNOLOGY through the cooperation of Associate Editor Aksel G. Olsen and the General Foods Corporation of New York, N. Y. The abbreviations found in these abstracts are similar to those used by Chemical Abstracts.

WE'RE PUTTING A LOT OF FRESH THINKING INTO CANS

Right now you will find hundreds of research projects in work at the main Continental research laboratories in Chicago... but high on the list is how to produce more cans from less tin.

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(This advertisement originally appeared in full-color in TIME, BUSINESS WEEK and FORTUNE.)

CONTINENTAL CAN COMPANY

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Abstracts

(Continued from page 8)

VOLCANI, R. Agric. Res. Sta., Rehovoth, Israel, *Bull.* No. 53 (1950); *Food Sci. Abst., 23,* 148, No. 589 (1951).

A. The butter fat content of milk falls in hot weather, and rises with falling temp. The max. reduction of butter fat content occurs in June. The length of day may have an influence as well as temp. B. Feeding of citrus fruit to cows in place of part of the green fodder of the ration caused an increase in the fat content of the milk and sometimes in milk yield. Essential oil of orange caused no rise in butter fat, and in amts. of 50 g. per day per cow, reduced appetite. Orange pulp and orange peel both appeared to increase milk yield and fat content. The expts. must be repeated at different seasons because of seasonal variation in milk fat content.

MILK AND EGG PRODUCTS

The production of stable meringues.

Baker's Digest, 24, 67-9 (1950); *Biol. Abstracts, 25,* 70, No. 748 (1951).

Meringues may be defined as foams produced by the whipping and aeration of egg whites in which sugar and other substances are dissolved. Meringues tend to break down, especially when made with a minimum amt. of egg white, which is the costliest ingredient. Breakdown leads to shrinkage, crumbling, and weeping. Weeping, the formation of small droplets of syrup on the meringue surface, is particularly troublesome. Meringues should also yield and retain max. vol. without too high content of egg whites. The basic formula for meringues is 1 qt. egg whites (approx. 45% of the total batch) with about 2.5 lbs. of sugar equivalent to 55% of the batch. There are many modifications of this formula. Certain water-sol. gums as agar-agar and locust bean gum may be used to stabilize the meringue. Starch is also used. These substances all compete for the available water and mutually interfere when used in heated blends for stabilizing meringues. An exception are gums extd. from sea plants which liquefy at lower temp. than agar-agar, and also at a lower temp. than that at which starch gelatinizes. They appear to react with the protein of egg whites to form a protein gel which resists breakdown and weeping. These sea plant extractives are highly refined hydrocolloids produced by modern manufg. methods for use as meringue stabilizing agents. About 1% of total wt. of the meringue or 3% based on the added water of the extractive is recommended. Details of the method are stated, with precautions found advisable in actual production.

Use of propyl gallate to defer development of oxidized flavor in market milk.

CHILSON, W. H., MARTIN, W. H., AND WHITNAH, C. H. *J. Dairy Sci., 33,* 925-8 (1951).

The addn. of propyl gallate to freshly pasteurized milk at the rate of 20 mg. per liter was found to prevent the development of oxidized flavor effectively for a 14-day storage period at 35° F. The propyl gallate treatment was equally effective with or without 0.5 p.p.m. of added copper. Ascorbic acid, natural or added, was not stabilized by the propyl gallate.

Comparison of rate of deterioration of storage and nonstorage eggs.

OTTE, A. W., WOLK, J., AND MCNALLY, E. H. *Am. Egg and Poultry Rev., 11,* 82 (1950); *Biol. Abstracts, 25,* 1229, No. 13310 (1951).

Graphs showing the changes in wt. and quality of storage and nonstorage eggs, during specified holding periods are given. Regardless of the length of time eggs had been in storage at 30° F., the same pattern of decline in quality changes occurred when they were taken out and held at 41, 59 and 77° F. Loss of wt. during subsequent holding periods following storage at 30° F. increased as temp. increased. Loss of quality and loss of wt. occurred at practically the same rate for both storage and nonstorage eggs that were of about the same quality at the time eggs were held at 41, 59 and 77° F.

PECTIN

Evaluating low esterified pectins.

HENGLEIN, F. A., AND HANN, M. *Z. Lebensm.-Untersuch. u. -Forsch., 92,* 178-84 (1951); *C. A., 45,* 4372a (1951).

A method is proposed for the evaluation of the low esterified pectins used for manuf. of jelly. It consists of the amt. of pectin with 35% sugar, at pH 2.9, and at 0.04% Ca, required to give a 200-g. pectinometer reading according to the method of Luers and Lochmuller. The Ca content is made to the optimum of 0.04% with $Ca_3(PO_4)_2$.

TASTE

A procedure for quantifying subjective appraisals of odor, flavor and texture of food-stuffs.

HOPKINS, J. W. *Biometrics, 6,* 1 (1950); *Food Sci. Abst., 23,* 208, No. 866 (1951).

The substances used for expts. in appraisal of odor, flavor, and texture were (1) methyl ethyl ketone (pungent), (2) n-butyl aldehyde (sweetish pungent), and (3) n-caprylic acid (rancid), each incorporated in hydrogenated cooking fat in 8 different concns.; (4) dried skim milk, fortified with lactose, suspended in water in 8 different concns., and (5) the same powder in a fixed amt., with 8 graded addns. of lactic acid. Expts. were also made on: bacon, with different salt contents, and after storage for different periods; processed and stored poultry; processed and stored butter; processed edible oils; and preserved fruits. A scoring procedure assigning the integers 0 to 5 to 6 defined gradations ranging from "none" to "gross" of intensity of abnormal or undesirable constituents, and those from −5 to +5 to 11 gradations ranging from "gross deficiency" to "gross excess" of typical or desirable attributes was employed. In tests with unselected groups of some 20 individuals, the mean scores recorded increased in proportion to relative increments in single sensory stimuli, and up to 8 test samples could be appraised for 2 or 3 attributes concurrently. Appraisals of "typical" attributes on the scale of −5 to +5 were on the whole more variable than those of "abnormal" attributes on the scale of 0 to 5, and appraisals of flavor more variable than those of odor or texture or viscidity. The results are considered math. Both inter-individual differences in discrimination, and intra-individual inconsistencies, contributed to the observed variability in single scores, and, on the 0 to 5 scale especially, the relation of variance to mean tended in practice to resemble that of a binomial variate.

The tastes. Part III. The sweet taste.

MONCRIEFF, R. W. *Perfumery Essential Oil Record, 42,* 25-30 (1951).

Review of recorded information concerning the sweet taste and substances affecting the sweet taste. Several lists of natural sugars, arranged in order of sweetness by various methods and a discussion of a few of the synthetic sweeteners are presented. Attempts to correlate sweetness with mol. structure have been unsuccessful. The author prefers the idea of a mol. configuration complementing that of the taste receptors, analogous to a lock and key.

The tastes. Part IV. The bitter taste.

MONCRIEFF, R. W. *Perfumery Essential Oil Record, 42,* 51-5 (1951).

The ability to taste bitterness is a protective mechanism, warning against the ingestion of poisons. A collection of observations on the bitterness of compds., effect of temp. on apparent bitterness, bitter-taste blindness, etc. is presented. As a generalization, increasing mol. wt. within a series tends to favor appearance of bitterness.

Sweetness and molecular structure.

JACOBS, M. B. *Am. Perfumer Essen. Oil Rev., 2,* 129-137 (1951).

Several conflicting chemical bases for sweetness are discussed. There is need for more work and possible verification of some data.

(Continued on page 20 following technical papers)

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OUR SOLDIERS' K-RATIONS, DESIGNED TO GIVE THE MOST HEALTH AND ENERGY IN THE SMALLEST PACKAGE, CONTAIN DRIED YEAST.

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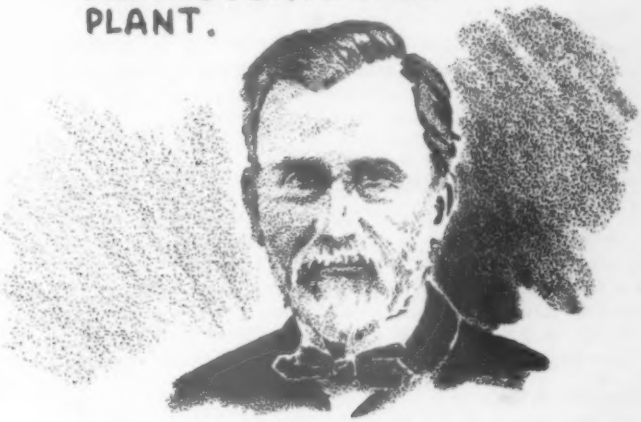

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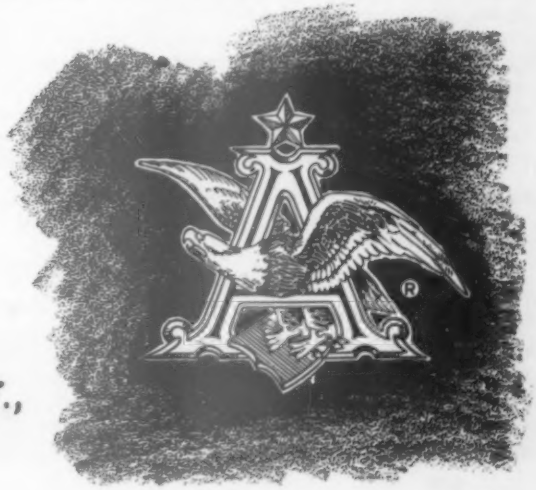

Abstracts

(Continued from page 12 preceding technical papers)

VEGETABLES

Effect of reheating on palatability, nutritive value, and bacterial count of frozen cooked foods. I. Vegetables.

CAUSEY, K., AND FENTON, F. *J. Am. Dietet. Assoc., 27,* 390-5 (1951).

Statistically significant differences in the palatability data were as follows: Significant differences between reheating methods occurred in the flavor scores for Swiss chard, with the double boiler method preferred. The color of broccoli was best when reheated in the double boiler, and the aroma was best when reheated in the dielec. oven. The surface appearance of the diced carrots was best in those reheated in boiling water. This method was also best for the surface appearance and color of the shredded beets. No differences in ascorbic acid retention owing to reheating methods were observed. Thiamine and riboflavin contents of the raw cooked vegetables were detd. Bacterial counts were low before and after reheating.

PACKAGING

Rat-repellent findings.

WELCH, J. F. *Modern Packaging, 9,* 138-40, May, 1951.

Adhesives vulnerable to rodent attack may be protected through the use of repellent compds. employed in a concn. of 1% zinc dimethyldithiocarbamatecyclohexylamine complex and tetramethyl thiuramdisulfide gave the best protection.

Flavor factors in frozen food wraps.

WINTER, J. D., AND HUSTRULID, A. *Modern Packaging, 9,* 133-7, May, 1951.

A study of the effect of packaging materials on the desiccation and flavor of frozen ground beef. Desiccation, per se, is not a reliable criterion for evaluating a packaging material with respect to flavor retention. Measurements of the oxygen permeability of the packaging materials indicate that this factor is important in the retention of flavor during freezer storage.

Collapsible drum.

Modern Packaging, 9, 89, May, 1951.

A non-rigid synthetic rubber-fabric container holds 55 gals., and may be collapsed for return and re-use. Where returnable drums are now used, the new container makes possible substantial savings in shipping costs. Durability is said to exceed that of metal or fibre drums.

PATENTS (U. S. A.)

Process for the manufacture of a completely soluble highly nutrient product in powder form.

NEEF, F. *2,553,467,* May 15, 1951.

A process for manufg. a highly nutritious sol. product in powder form capable of yielding a beverage upon addn. of aq. liquids, which comprises the steps of lixiviating material selected from the group of coffee and tea with an aq. soln. of citric acid, concg. the ext. thus obtained, neutralizing concentrate, adding sugar and milk to the neutralized ext., treating ext. with a weakly alk. soln. selected from the class consisting of sodium salts of org. acids and sodium salts of phosphoric acids, and mixts. thereof, and converting the treated ext. into a dry powder.

Oat composition of reduced viscosity characteristics.

MUSHER, S. Assignor to Musher Foundation, Inc. *2,554,869,* May 29, 1951.

An over 180° F. dry heated, finely divided special oat fraction, fraction having a fineness of at least about 60 mesh, fraction contg. in excess of about 20% total protein and being free of those particles which will go through a 60 mesh screen when the dehulled oats are pulverized to a fineness that will permit 85% to 95% thereof to pass through a 60 mesh screen, fraction consisting of between about 5% and 15% of pulverized dehulled oats.

Baking composition.

MCDONALD, G. A. Assignor to Victor Chemical Works. *2,550,491,* Apr. 24, 1951.

A baking powder compn. comprising sodium bicarbonate, starch, and a baking acid, a substantial proportion of which is a complex cryst. compd. having the formula: $MM'_2H_{14}(PO_4)_8 \cdot 4H_2O$; wherein M represents a member of the class consisting of sodium potassium and ammonium and M′ represents a trivalent metal atom of the class consisting of aluminum and iron.

Process for treatment of cereals.

HUZENLAUB, E. G., AND ROGERS, F. H. Assignors, by direct and mesne assignments, to Mars and Huzenlaub. *2,555,235,* May 29, 1951.

That method of enriching the endosperm of cereal grain comprising the steps of removing entrained air from the voids and capillary spaces of grain by subjecting it to a high vacuum treatment, steeping grain under superatm. pressure in a warm aq. ext. of enriching material from the group consisting of grain and grain offals to introduce the enriching material into the endosperm, steeping step being conducted at a temp. below 80° C. so that the natural enzymes of the grain are not destroyed, sepg. the ext. from the grain, maintaining the grain at a temp. between 40° C. and 80° C. and at a pH value between 4.5 and 7 for several hrs. to permit enzymic reaction to occur in the grain, treating grain with live steam under pressure, suddenly releasing steam at a high rate of flow, and drying grain.

Salad oils and method of producing the same.

MUSHER, S. Assignor to Musher Foundation, Inc. *2,554,872,* May 29, 1951.

A method of making an oil having a new and intensified flavor which comprises aging and fermenting ripe olives in a relatively dil. common salt soln. for a period of at least about six months, grinding the olives, expressing the olives and sepg. the oil from the aq. brine fraction, salt soln. contg. between about 5% and 13% common salt.

Shortening composition and method of preparing the same.

HANSEN, F. F. *2,550,558,* Apr. 24, 1951.

The process of prepg. a shortening compn. for use in the baking industry, which comprises sepg. lecithin and assocd. cephalin from accompanying vegetable oil, reacting a soln. of the lecithin and cephalin with hydrochloric acid of a concn. between about 0.5N and 1N, hydrolyzing choline and colamine constitutents sepd. from the lecithin and cephalin by the hydrochloric acid, sepg. the hydrolyzed choline and colamine constituents from the remaining soln., reacting the remaining lecithin-derived compds. with glycerine in controlled amts. for producing a predetd. glyceride of the lecithin compd. and incorporating the resulting glyceride into a shortening compn. for increasing creaming properties of the compn. and increasing resistance to deterioration through rancidification.

Stabilization of organic materials.

CHENICEK, J. A. Assignor to Universal Oil Products Co. *2,553,441,* May 15, 1951.

A method of stabilizing an org. material subject to oxidative deterioration which comprises adding thereto an inhibitor comprising a disubstituted amino-methyl-dihydroxybenzene.

Stabilization of organic compounds.

THOMPSON, R. B., AND CHENICEK, J. A. Assignors to Universal Oil Products Co. *2,554,687,* May 29, 1951.

A method of stabilizing an org. material normally subject to oxidative deterioration which comprises adding thereto an inhibitor comprisng a tri-cyclic compd. contg. the naphthalene ring system having fused to one of its benzene rings, by a carbon atom and a heterocyclic oxygen atom, a member of the group consisting of dihydro furan and dihydro pyran rings, one benzene ring having a hydroxy group in the position para to heterocyclic oxygen atom.

(Continued on page 23)

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Abstracts

(Continued from page 20)

Fully cured olive brine treated food glyceride oils and method of producing same.

MUSHER, S. Assignor to Musher Foundation, Inc. 2,554,870, May 29, 1951.

A method of making an oil having an intensified olive flavor which comprises curing ripe olives in brine for a period of at least about 6 months, sepg. the brine from the fully cured ripe olives, mixing the brine with an oil and then sepg. the oil from the brine.

Process of canning seafood and resultant product.

MCFEE, E. P., AND PETERS, J. A. Assignors to Gorton-Pew Fisheries Co., Ltd. 2,554,625, May 29, 1951.

Canned seafood free from struvite crystals and having a substantially less magnesium content than is normally present in seafood and having a pH about neutral.

Method of preparing a shrimp product.

GUICE, E. P., AND HICKEY, E. E. 2,555,232, May 29, 1951.

The method of prepg. a large simulant shrimp from small and broken unmarketable shrimp consisting of taking broken pieces and small raw picked cleaned shrimp meat, first deveining shrimp meat, shredding the individual raw meat into fibers and at the same time breaking down and rupturing the cellular structure of meat, thereby voiding to a max. degree the existing exts. and moisture including the jellifying protoplasm therein contd. to prevent quick freezing of the product without formation of ice crystals, adding a sufficient quantity of curative and preservative consisting of sodium chloride to exposed tissues, molding these shredded fibers in layers to resemble shrimp and cooking and setting the jellifying protoplasm of the aggregate at approx. 210° F. at 10 lbs. pressure and also searing the product to produce a new skin on the exterior for holding the delicate tender fibers in a sure bond, deveined meat being then kettle cooked and canned in its simulant large shrimp form.

Process of canning fish and shellfish and resultant product.

KREIDL, E. L., AND MCFEE, E. P. Assignors, by direct and mesne assignments, to Gorton-Pew Fisheries Co., Ltd. 2,555,236, May 29, 1951.

Canned food of the group consisting of fish and shell fish having incorporated therewith a water sol. glassy alkali phosphate in an amt. sufficient to substantially suppress the crystn. of struvite.

Frozen food thawing indicator.

HOFFMAN, S. Assignor of one-third to Irving N. Rosen and one-third to Emil L. Cohen. 2,553,369, May 15, 1951.

A frozen food thawing indicator comprising a hermetically sealed transparent enclosure contg. a carrier bearing, in combination, hydrated potassium tri-iodide and sol. starch and a diastase applied to the carrier at sub-freezing temps. and maintained thereat prior to use.

Ice cream manufacture.

KNECHTGES, J. W. Assignor, by mesne assignments, to Swift & Co. 2,550,656, Apr. 24, 1951.

A process of treating sweetened whole fruit used in frozen confection products, which comprises sepg. the fresh uncooked whole fruit from the fruit juice syrup formed when the fruit is sweetened, dispersing throughout the fruit juice syrup a gel-forming substance, combining the fruit juice syrup contg. the gel-forming substance with the whole fruit, and maintaining the gel-contg. fruit juice syrup in contact with the whole fruit until a slight gel is formed, whereupon the fruit when introduced into a frozen confection will not have objectionable ice crystals in fruit.

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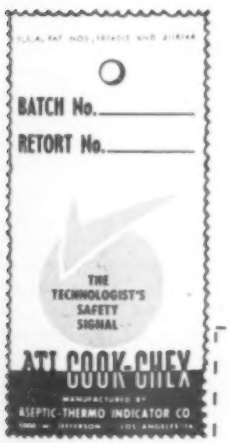

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Abstracts

Process for purifying juice.

WIKLUND, O. Assignor to Svenska Sockerfabriks Aktiebolaget. 2,547,298, Apr. 3, 1951.

The method of purifying sugar beet juice by predefecation and thereafter by main defacation with lime to an extent effecting substantially optimum pptn. of impurities in colloidal form and thereafter by treatment with CO_2 to effect satn. to an optimum alkalinity conducive to optimum pptn. of calcium carbonate along with impurities, and sepn. from the juice of the ppts.; characterized by subjecting predefecated juice to a first treatment with CO_2 for effecting its supersatn. beyond the degree normally required to attain optimum pptn. coincident with a significant reduction in alkalinity below optimum, effecting predefecation of the juice in the presence of a quantity of thus supersatd. juice with its ppt., quantity being sufficient to produce stabilized aggregations of pptg. matter with carbonate ppt., subjecting the thus treated juice to main defecation and thereafter to a second treatment with CO_2 to effect satn. to an optimum alkalinity conducive to optimum addnl. pptn., and sepg. the ppt. from the juice.

Method of preparing a whipping agent from casein.

OBERG, E. B., NELSON, C. E., AND HANKINSON, C. L. Assignors to Carnation Co. 2,547,136, Apr. 3, 1951.

In a method of manufg. a powdered whipping agent derived from milk, the steps comprising sepg. from milk, its casein component in the form of a curd; dispersing curd in water to form a mixt.; adding to mixt. at least one proteolytic enzyme; partially digesting mixt. under appropriate temp. and pH conditions to activate the enzyme; making the resulting partial digest slightly acid and heating it at between 80° and 100° C. for a period of from 1 to 2 hrs. to destroy enzyme and to ppt. the undigested fraction; filtering partial digest to remove the ppt.; concg. the resulting filtered soln.; making the soln. alk.; and drying the alk. soln. to provide the powder.

Method for obtaining pectinic acids of low methyl ester content in concentrated form.

MACLAY, W. D., SHEPHERD, A. D., MCCREADY, R. M., AND GRAHAM, R. P. Assignors to U. S. A. 2,550,705, May 1, 1951.

A process of prepg. low-methoxyl pectinic acids from a dil. aq. soln. of pectin which comprises mixing with soln. a water-sol. salt of a polyvalent metal, sepg. the pptd. pectin-polyvalent metal compn., dispersing it in substantially pure water, subjecting the dispersion to the action of a demethoxylating agent to form low-methoxyl pectinic acids, and isolating the low-methoxyl pectinic acids so formed.

Preservation of food products.

JENSEN, L. B. Assignor to Swift & Co. 2,550,255-69, Apr. 24, 1951.

In the process of treating food products, the step of adding to a food product a small amt. of an antibiotic substance derived from: 2,550,255—the tree *Persea gratissima* by treatment with a non-aq. org. solvent; 2,550,256—a plant of the genus Krameria by treatment with a non-aq. org. solvent; 2,550,257—the wood of the members of the genus Vitis; 2,550,258—the plant *Grindelia squarrosa;* 2,550,259—the plant *Chondrodendron tomentosum;* by treatment with a non-aq. org. solvent; 2,550,260—the root of the vine *Celastrus scandens;* 2,550,261—the plant *Maclura pomifera;* 2,550,262—the plant *Agrimonia gryposepala;* 2,550,263—Thuja; 2,550,264—the plant *Petalostemum purpureum* by treatment with a non-aq. org. solvent; 2,550,265—the plant *Geum vernum;* 2,550,266—the plant *Hypericum perforatum;* 2,550,267—the plant *Cetraria islandica;* 2,550,268—the tree *Juglans cinerea;* 2,550,269—the plant *Alpinia officinarum* by treatment with a non-aq. org. solvent; to preserve food product against pathogenic bacteria responsible for food poisoning and spoilage.

Dry pudding compositions.

HINZ, JR., H. C., SCHERMERHORN, SR., G. R., AND DORN, F. L. Assignors to American Home Foods, Inc. 2,554,143, May 22, 1951.

A dry compn. for producing a pudding comprising pregelatinized pudding starch, a hydrophobic agent for retarding the hydration of the starch substantially uniformly commingled with starch in an amt. not exceeding about 10% by wt. of the starch, and a sweetening agent.

Separation and fractionation of sugars.

MONTGOMERY, E. M., AND WEAKLEY, F. B. Assignors to the U. S. A. 2,549,840, Apr. 24, 1951.

The process which comprises contacting an aq. soln. contg. glucose and polysaccharides with activated carbon whereby the polysaccharide sugars are removed from the soln. by relatively strong adsorption upon the carbon, subsequently displacing less strongly adsorbed glucose with water, recovering the thus purified glucose soln., displacing the adsorbed polysaccharides from the carbon by eluting with one of the group consisting of phenol, acetic acid and ephedrine in 0.2 to 10% aq. soln., and recovering the displaced polysaccharide soln.

Method of cleaning starch from heated surfaces.

THOMAS, L. M. Assignor to The Keever Starch Co. 2,550,885, May 1, 1951.

A method of cleaning starch and starch products from heated surfaces comprising the step of rubbing such surfaces with a water soln. of sorbitol having a diatomaceous earth suspended in the soln. consisting of 100 parts of water, approx. 30 parts of sorbitol, approx. 25 parts of diatomaceous earth and approx. 10 to 30 parts of kaolin.

Phosphatide composition.

KARJALS, S. A. Assignor to Central Soya Co., Inc. 2,555,137, May 29, 1951.

As a new compn. of matter, phosphatide and oil compn. of low viscosity at room temp. and stable toward oil sepn., consisting of 55-60% phosphatides, 1-3% lactic acid, 2-3% high mol. wt. fatty acids, and 34-42% of soy bean oil.

Machine for depositing nuts on candy bars.

ZEUN, L. H. Assignor to Peter Paul, Inc. 2,547,516, Apr. 3, 1951.

In a machine of the character described, means for feeding a plurality of candy bars, a nut hopper having an opening in the bottom for the passage of the nuts, a rotatable drum below the hopper and above the path of travel of the candy bars, means reciprocatably mounted on drum having a plurality of pockets for receiving the nuts from the hopper, drum and reciprocatable means being movable beneath the hopper opening, means for reciprocating pocket carrying means to position a nut in each pocket, and means for holding the nuts in the pockets as the drum is rotated from receiving to discharging position above the candy bars.

Gelatinized starch.

HOFMAN, T. F. H., AND KRIZKOVSKY, F. L. P. Assignors to N. V. W. A. Scholten's Aardappelmeelfabrieken. 2,548,263, Apr. 10, 1951.

A dry food product, consisting of potato starch which is gelatinized by heating and simultaneous drying of a mixt. of potato starch with not more than an equal wt. of water to a temp. above the gelatinizing point, but not exceeding 180° C., the temp. and duration of the heating treatment being sufficient to destroy the granular sructure of substantially all starch granules and cement the same together in a mass so that they are cemented together in the form of small pieces of broken film of a horny character, insol. in cold water and swellable to a limited extent when heated with water, but retaining their general form.

Quick-freezing method and apparatus.

CRAIG, S. C. 2,554,560, May 29, 1951.

App. for continuously quick freezing products, comprising an expansion chamber, a tube extending through the chamber and having at least one port in the portion thereof within the chamber to bring the interior of the tube into communication with chamber, tube extending beyond the opposite ends of the chamber, a plurality of containers for receiving the products movably

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Abstracts

positioned in the tube and adapted to be moved therethrough, means for sealing the containers in the tube from the opposite ends of the latter, means for removing air from the container in the tube before reaching the port in the latter, and means for directing a vaporizable refrigerant under pressure into the chamber.

Apparatus for holding citrus fruit.

POLK, SR., R., AND POLK, JR., R. Assignors to Polk Development Co. 2,552,733, May 15, 1951.

In app. for sectionizing citrus fruit, means for supporting the core of the fruit comprising a first series of parallel tines equally spaced circumferentially in a circle for insertion polarwise into sections of the fruit closely surrounding the core thereof, alternate tines of the series being of a length sufficient to penetrate approx. through the fruit and the remainder of the tines of series being of a length that when fully inserted will penetrate short of the axial boundary of the seed bearing region of the fruit, a second series of parallel tines corresponding in no. with shorter tines and respectively aligned coaxially therewith, and means for axially moving one series relatively to the other series to insert the two series of tines in the fruit with the tines of the second series in interdigitating relationship to the tines of the first series and in axially opposed relationship to the shorter tines of the first series, the tines of the second series also being of a length that when fully inserted in the fruit they will penetrate short of the axial boundary of seed bearing region.

Feather plucker for poultry.

HODGES, F. A. 2,554,671, May 29, 1951.

A feather plucker for poultry comprising, a rotary frame having a plurality of hammer pivoting rods parallel to the axis of rotation of the frame, a plurality of hammers pivotally mounted on the hammer pivoting rods and held extended by the rotary motion of the frame for knocking feathers from the poultry applied thereto, pivotally mounted hammers comprising an elongated member having a leading side and a trailing side and having a hole therethrough at one end and parallel to the leading and trailing sides for receieving hammer pivoting rods for pivoting mounting the hammers thereon, the leading sides of hammer substantially uniform and of substantial area and provided with serrations.

Live fowl holder.

GARFIELD, L. F. 2,548,013, Apr. 10, 1951.

A device of the class described comprising a portable, box-like support, a pair of broad, curved jaws capable of embracing a fowl therebetween, pivot means supporting jaws on support, a lever extension from each of jaws, lever extensions being crossed beneath pivot means and extending into support, a pair of toggle links, one of toggle links being pivotally connected to one of lever extensions for opening and closing jaws and the other of toggle links being pivotally connected to the other lever extension, and operating means comprising a connecting link pivotally connected to toggle links, a manual lever pivotally mounted on support and extending thereinto, a serrated member adjacent manual lever, a dog pivotally mounted on manual lever and engageable with serrated member, a spring urging dog into engagement with serrated member, manual releasing means assocd. with manual lever for releasing dog, and movement translating means within support and interconnecting manual lever and connecting link.

Potato viner and cleaner.

ZEH, G. H., ZEH, R. C., AND ZEH, R. J. 2,553,072, May 15, 1951.

A separator for use with potato diggers, comprising a rotatable frame to receive potatoes and assocd. refuse, a chute for delivering potatoes and refuse to the external periphery of the frame, spaced bars on the frame forming stripper mechanisms for sepg. vines and other light refuse from the potatoes, means for

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FISHERY ADVISORY GROUP MEETS WITH DFA OFFICIALS

Declaring that "food is as essential as guns in the mobilization program, and fish is an important segment of food," Secretary of the Interior Oscar L. Chapman opened a two-day meeting in Washington, D. C., on April 16, 1951, of representatives of the commercial fishing industry who were called to Washington to confer with officials of the Defense Fisheries Administration and other Government agencies.

The meeting was held under the joint auspices of the Defense Fisheries Administration of the Department of the Interior, the Office of Price Stabilization, and the Department of Agriculture for the purpose of exchanging information and discussing problems of maintaining a high production of seafood despite shortages of materials and manpower.

Established recently as the Industry Advisory Committee for Fresh and Frozen Fish by the three Government agencies, the industry members are representative vessel owners and wholesale fish dealers from all the important fish-producing areas of the country who deal principally with fish in the fresh and frozen stages.

The meeting was devoted to production problems, a discussion of the general agriculture situation and the program being followed by a means to increase production of most agricultural commodities; an examination of the possible military requirements for fish during the coming year; the present aspects of the manpower situation; the function of the Selective Service System and the possibilities of obtaining deferments for fishermen in critical occupations; methods of adjusting wage rates controlled under the January 25, 1951 freeze order; a discussion of shortages of materials and priorities assistance as well as the possible impact of a controlled materials plan on the fishing industry; a discussion of the probability of increased imports of many varieties of fish; and a discussion of price controls on fresh and frozen fish. [*Commercial Fisheries Review,* 13 (5) 64 (1951)].

SMALL BUSINESS SHARES IN AWARDS BY QUARTERMASTER

Small business firms of the United States received 46.2 percent of the dollar value and 71.6 percent of the number of contracts awarded by the Army Quartermaster Corps during the eight months ending April 30, 1951, the Department of the Army announced.

During this period, Quartermaster purchase, including these covering the requirements of troops in Korea, aggregated $3,451,220. Of this amount, $1,596,368,000 was awarded to small business firms.

Total number of contracts awarded during the eight months was 211,890, of which 151, 850 contracts were with small business firms.

The Quartermaster Corps procures food, clothing, tentage, and equipage as well as a wide range of other materials involving a total of about 70,000 different kinds of items.

Special representatives are assigned to each purchasing office and to the Office of The Quartermaster General in Washington, D. C., to render all possible assistance to small business firms. [From *Defense Production Record,* 1 (11) 5 (1951)].

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Abstracts

(Continued from page 26)

rotating the frame to strip the potatoes, a conveyor inside the frame to receive potatoes and heavy refuse falling through the spaced bars, and a plurality of spaced rollers positioned in an extension of the conveyor and extending to one side of the frame to receive material from the conveyor for sepg. heavy refuse such as stones and dirt from the potatoes and delivering cleansed potatoes to a discharge point at the side of the potato digger.

Seed potato slicer.

HANNA, W. E. *2,547,702*, Apr. 3, 1951.

A potato slicer comprising an open frame, an annular series of downwardly converging chute sections to form a discharge, pivotal mountings on the frame for the respective sections spaced outward from the region of the discharge, mountings locating the sections with clearance spaces therebetween, rotatable arms swingable through clearance spaces from substantially above the chute sections downwardly toward discharge, sections having opposed slots, spaces and slots alternating to form a series of narrow openings radiating from the discharge, diverging stationary knife blades fixed to the frame in proximity to the discharge and registering with the slots in the sections swinging theretoward, a power actuated shaft, addnl. shafts operatively connected with power actuated shaft and providing mounting means for operating arms, and vibrator devices operatively connected between the addnl. shafts and the chute sections remote from the discharge to oscillate the sections on their pivotal mountings and thereby jostle a potato in its descent upon the sections to lodge at the discharge in position for the arms to push on portions of the potato between the knife blades and urge it past the blades.

Process of handling sugar.

PAINE, H. S., AND HUGHES, M. F. Assignors to Refined Syrups & Sugars, Inc. *2,546,179*, Mar. *27*, 1951.

A process of handling unrefined sucrose which comprises forming a high density aq. soln. thereof having a pH of about 6 to about 7.5, adding a small proportion of a preservative thereto to inhibit growth of yeasts and molds in soln., and transporting or storing the soln. in this form while protecting its surface from free contact with the air, preservative comprising a substance that does not react appreciably with the sucrose.

Retarding yeast growth in sugar sirups.

WADSWORTH, D. V., AND OWEN, W. L. Assignors to Refined Syrups & Sugars, Inc. *2,546,178*, Mar. *27*, 1951.

A process of retarding growth of molds and yeasts in a syrup contg. no more than a minor proportion of fermentable sugars which comprises maintaining a layer of material in contact with the surface of syrup to prevent access of air thereto.

PATENTS (BRITISH)

Process for making dry starch preparations soluble in cold water.

W. A. Scholten's Chemische Fabrieken N. V. 634,368, Mar. 5, 1946; *Brit. Abst., BII*, 957 (1950).

Starch prepns. are described which dissolve readily in cold H_2O to produce solns. which, after addn. of a catalyst, produce H_2O-insol. layers when dried on substrate. They are readily made by mixing a cold-swelling starch (such as is obtained by treatment with an oxidizing, hydrolyzing, etherifying, or esterifying agent) with an aldehyde and with a substance, other than aminotriazine, capable of forming a synthetic resin with the aldehyde. The catalyst is usually acid in reaction or a substance capable of yielding acid when heated. No conversion, or only very slow conversion, occurs in the cold when the soln. is dried at a raised temp., e.g., when used for the finishing of fabrics, a reaction occurs leading to the formation of an insol. starch product. Numerous alternatives and formulae are given.

MORE AGRICULTURAL SPECIALISTS NEEDED ABROAD

Six hundred agricultural specialists from all parts of the United States are needed to represent this country abroad in technical cooperation programs, including the Point Four program, under present plans of expansion, the U. S. Department of Agriculture announced today.

The Department's Office of Personnel is developing a national roster of professional agriculturists to be used by the Department, and other Federal and public international organizations, in recruiting personnel for foreign assignments. Qualified specialists are urged to apply for these positions, and their employers are urged to cooperate in making their services available so that this peace-building work may proceed rapidly. Those who receive appointments will be contributing to an important phase of national foreign policy, the Department advised.

As technical cooperation programs expand, trained agriculturists will be called for in increasing numbers to serve in professional capacities in foreign posts, the Department said. Under present plans both the number of countries participating and the number of U. S. agriculturists serving in each will be increased.

The program requires employees with professional academic training and several years of responsible professional experience in the field of agriculture. Applicants must be skilled in their professions, have leadership ability and maturity of judgment, and generally be capable of filling the role of agricultural statesmen as they represent the United States abroad.

Areas into which agricultural specialists will be sent include Europe, Latin America, Africa, the Near East, and the Far East. Agricultural educational institutions, many of whom have already supplied research and extension leaders now abroad, will be urged to send additional members of their faculties and staffs on these assignments.

Research and extension are the principal categories of work in agricultural aspects of technical cooperation. The greatest need is for individuals trained in research or extension phases of soils, forestry, crops, animal husbandry, pest and disease control, agricultural engineering, economics and marketing, and social sciences.

Appointments are exempt from Civil Service examination. Rates for the seven classes of specialist positions range from $5,370 to $10,330 a year. Candidates preferably should be from 30 to 60 years old. Applicants over 60 may be considered for some assignments. Travel expenses to foreign posts for the specialist and dependents will be paid by the Government. Employees also may receive quarters and living allowances, as well as the special Foreign Service health and leave benefits, and in some cases post differentials of from 10 to 25 percent.

Persons interested in the assignments, who are qualified as a result of professional academic training and several years of responsible professional experience in the field of agriculture, are asked to write to the U. S. Department of Agriculture, Office of Personnel, Washington 25, D. C.

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GUAYMAS SHRIMP INDUSTRY OVEREXPANDED

Though some well-established firms in the shrimp fishing and freezing business in Guaymas, Mexico, are managing not to lose money under present conditions of catch and market, most Guaymas plant and boat owners find themselves overexpanded, short of capital, and unable to cover all of the fixed costs which are a result of their enthusiastic preparation for a record 1950-51 shrimp season. The leaders of the Mexican industry continue to beseech their government for relief from export taxes, and are at present on a special mission to Mexico City where they will request the Federal Government to assist them in establishing a credit organization which will assist in the financing of the industry's future operations, according to an April 6 American consular dispatch from that city. [From *Commercial Fisheries Review*, **13** (5) 54 (1951)].

U. S. TUNA PRODUCTION FOR 1950

The United States tuna landings (including bonito and yellow tail) in 1950 were at an all-time high. The total catch of tuna and tuna-like fish was 400,000,000 in 1950 as compared with 328,872,000 pounds in 1948. The canned pack of tuna and tuna-like fish in 1950 totaled 9,100,000 standard cases, compared with 7,130,453 cases in 1949. [From *Commercial Fisheries Review*, **13** (5) 5 (1951)].

WORLD-WIDE PRODUCTION OF CITRUS FRUIT

World production of citrus fruit has increased considerably since the pre-war years. The postwar average (1946-49) is 28 percent above prewar for oranges (which account for 75 percent of all citrus production), 72 percent for grapefruit, and 13 percent for lemons. The U. S. share in total production has increased in all three groups. For the Mediterranean region as a whole, postwar production has been below prewar except in 1947/48; but steady recovery has taken place, and there has been a clear upward trend since the early post-war years in the aggregate output of the Mediterranean group. Spain's orange production has, however, reached only about 80 percent of the level for the years prior to the Spanish Civil War, and Italian lemon production has averaged only 75 percent of prewar . One of the most striking developments in the Mediterranean region has been the rapid expansion in French North Africa's citrus production. In Latin America, Brazil has increased its production over the prewar level, and expansion in the British West Indies is being stimulated by the United Kingdom. The Union of South Africa has expanded its production steadily since the 1930's. (From FAO *Commodity Series*, Bull. 19, *Citrus and dried fruit*. December, 1950.)

P. H. S. EMERGENCY TRAINING

The first of a new series of Public Health Service short courses in emergency sanitation training was given recently at the Environmental Health Center in Cincinnati. The specialized five-day course covered problems of radiological, biological and chemical contamination of water, sewage, food and air.

The other courses of the series will start on September 17, November 12, 1951, and March 24, 1952, respectively. They are open to medical, engineering and other professional workers concerned with emergency sanitation problems. Specialized courses in stream pollution control also are being given at intervals at the Center. Tuition for all courses is free, but no provision is made for travel or living expenses of trainees.

Applications giving the candidate's name and a brief outline of his education and experience should be sent to the chief of the Specialized Sanitation Training Section, P.H.S. Environmental Health Center, 1014 Broadway, Cincinnati 2, Ohio. They should be accompanied by a recommendation from the health officer in the case of health department personnel, or from the division head for personnel of other organizations. [Health Officers *News Digest*, 16 (8) 16 (1951).]

REVIEW ON THE BIOCHEMISTRY OF INOSITOL AVAILABLE

Inositol has been known for more than a century as a common constituent of living matter. The meaning of its widespread occurrence in both plants and animals has long been sought but only in the past decade has evidence been obtained to indicate that it may have important nutritional and biological functions. The present survey was undertaken by Edward R. Weidlein, Jr. for the Mellon Institute and the results of the survey were published in "Bibliographic Series Bulletin No. 6" of the Mellon Institute, Pittsburgh, Pennsylvania.

The survey covers the definition, structure, isomers and derivitates of inositol, its biochemistry, methods of determination, occurrence, inositol as a microbiological growth factor, inositol as a factor in animal and human nutrition, the lipotropic action of inositol and the relationships between inositol and cholesterol. Further discussion deals with other physiological effects of inositol and the inhibitory analogues of inositol. A collection of 324 references completes the pamphlet which is available without charge upon request from The Mellon Institute, Pittsburgh, Pa. (ZIK)

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WANTED: Food-Dairy Technologists with sound college training and commercial exp. in food processing sought by large national organization for openings in Middlewest. Background, aptitude and performance may lead to lab., quality control, prod. supervision, and/or research and development. Please submit comprehensive personal abstract covering exp. and tech. training as well as recent photograph. REPLY BOX 167, Institute of Food Technologists, 176 W. Adams St., Chicago 3, Ill.

WANTED: Research Scientist to conduct nutritional studies to determine food requirements of service personnel, evaluate adequacy of proposed foods and rations and to conduct and direct other studies related to the nutritional characteristics of service foods and feeding. Applicants should have Ph.D. in nutrition or biochemistry with research experience in human nutrition. Canadian firm. Salary between $4,000 and $6,000. REPLY BOX 165, Institute of Food Technologists, 176 W. Adams St., Chicago 3, Ill.

AVAILABLE: In a few months I will be retired by a large food processing company. I am in perfect health with many years experience in research and production engineering. Two degrees. An opportunity to secure a man with creative ability to develop new processes, new products and new machines. My patents have made large sums for our firm. References above reproach from the highest executives. REPLY BOX 162, Institute of Food Technologists, 176 W. Adams St., Chicago 3, Ill.

PREPARED MIXES—Opening for technologist experienced in development and production of prepared mixes. Chemical or engineering background desired. Salary commensurate with ability and experience. REPLY RCD, Personnel Dept., Pillsbury Mills, Inc., Minneapolis 2, Minn.

WANTED: Technologist with background in Citrus Juices and some exp. in beverage flavorings to supervise prod. methods and research in our fruit juice drinks. Established Company. Keen taste discrimination very essential. Emphasis on logical thinking and initiative, not on extensive technical background. Excellent opportunity in new product. Salary open. REPLY BOX 166, Institute of Food Technologists, 176 W. Adams St., Chicago 3, Ill.

WANTED: Research Scientist for R. & D. in food packaging and packing in Canada. Experience with fiber products, plastic films, metal foils and cans, enamels, adhesives and inks. Ph.D. or M.Sc. in Chem. Eng., Chemistry or Physical Chemistry — some industrial experience. Initial salary $4,000 to $6,000. REPLY BOX 164, Institute of Food Technologists, 176 W. Adams St., Chicago 3, Ill.

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LABOR DEPARTMENT ISSUES SAFETY BOOKLET

Increased manpower in defense industries will mean the need for increased safety vigilance, particularly in those plants doing Government contract work under the Walsh-Healey Public Contract Act.

A booklet containing general safety and health standards to guide interested officials in the administration and enforcement of the Public Contracts Act has just been issued. The booklet was prepared by the Labor Department's Bureau of Labor Standards in cooperation with the Wage and Hour and Public Contracts Division.

Free copies of the booklet, "Safety and Health Standards," may be obtained from the Wage and Hour and Public Contracts Division, Department of Labor, Washington 25, D. C., or at the Division's regional offices.

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The Institute of Food Technologists assumes no responsibility for statements in contributed articles appearing in FOOD TECHNOLOGY. Editorials present only opinions of the writers and do not necessarily reflect policies of the Institute of Food Technologists.

News of the Institute

CHANGES IN MEMBERSHIP OF "COMMITTEE OF TASTE TESTING AND CONSUMER PREFERENCE" ANNOUNCED BY PRESIDENT FREY

President Charles N. Frey appointed David R. Peryam, Food and Container Institute of the Armed Forces, Chicago, Ill., and Robert C. Hockett of the Sugar Research Foundation, New York, N. Y., to serve on the "Committee of Taste Testing and Consumer Preference." Virgil O. Wodicka, listed as a member in the September issue of FOOD TECHNOLOGY, will not be able to serve on this Committee.

Regional Section News

NORTHEAST SECTION

The Section held its first Fall Meeting on October 4 at the Hotel Brunswick, Boston. Dr. Charles N. Frey, IFT National President, was on hand to address the group on the subject "Chemicals in foods." Executive Committee for the 1951-52 year is as follows:

Chairman: Loren B. Sjostrom, Head Food Research Dept., Arthur D. Little, Inc., Cambridge, Mass.

Vice-Chairman: J. Avery Dunn, Atlantic Gelatin Division, General Foods Corp., Woburn, Mass.

Secretary: Charles H. Shackleford, National Fish Dept., The Great Atlantic and Pacific Tea Co., Boston, Mass.

Treasurer: Ernest E. Lockhart, Food Chemistry Dept., Massachusetts Institute of Technology, Cambridge, Mass.

Councilors: Ernest C. Peakes, New England Confectionery Co., Cambridge, Mass. Arthur S. Levine, Food Technology Dept., University of Massachusetts, Amherst, Mass.

Additional Members: John M. Milne, Dorothy Muriels, Inc., Boston, Mass.; Lawrence P. Abare, First National Stores, Inc., Somerville, Mass.; Mary Harrigan, U. S. Food and Drug Administration, Boston, Mass.; Earl P. McFee, Gorton-Pew Fisheries Co. Ltd. Gloucester, Mass.

Retiring Chairman: Newton R. Cole, Walter Baker & Co., Dorchester, Mass.

WESTERN NEW YORK SECTION

Annual Fall Meeting of the Section was held on September 28 in the Empire Room of the Powers Hotel in Rochester, N. Y. The following papers were heard:

"Some quality control problems of paper food packages" by Alex Gourevitch, Department of Plant Sciences, Syracuse University, Syracuse, N. Y.

"Application of hydro-colloids in the food industries" by Leonard Stoloff, Krim-Ko Corporation, New Bedford, Mass.

"Effect of freezing on gluten in unbaked yeast doughs" by Anne Fluhr and Jean Simpson, College of Home Economics, Syracuse University, Syracuse, N. Y.

"Effect of Physical Treatment upon the Retrogradation of Starch Pastes" by P. E. Ramstad, School of Nutrition, Cornell University, Ithaca, N. Y.

Mr. Bruce Thorsberg of the Dow Corning Corporation was the dinner speaker. His subject was "Use of silicones in the food industry."

At the same meeting the following officers were elected for 1951-52:

Chairman: W. S. Conway, Jr., The Richardson Corp., Rochester, N. Y.

Vice-Chairman: Richard Henderson, Syracuse University, Syracuse, N. Y.

Secretary: E. L. Sexton, Best Foods, Inc., Buffalo, N. Y.

Treasurer: A. A. Gendreau, The R. T. French Co., Rochester, N. Y.

Section Councilor: John Fix, Research Department, American Can Co., Rochester, N. Y.

Executive Committee: E. G. Laughery, P. E. Ramstad, L. R. Patton, Jr., Sven E. Young, and Charles A. Stevenson.

PERSONNEL

ERNEST BOYCE of the Gerber Products Company has been transferred from Fremont, Michigan to the company's plant in Rochester, N. Y.

DANIEL J. HEALD, of Lowell, Mass., has been selected as the Fellow for the Food Processing Fellowship at the Illinois Institute of Technology for 1951-52. Mr. Heald obtained his B.S. degree in 1950 at Purdue University. The Fellowship was established at IIT by the Putnam Publishing Co., publishers of *Food Processing* magazine.

DOUGLAS E. MELZARD has joined the Flavor Laboratory of Arthur D. Little, Inc., Cambridge, Mass. Mr. Melzard received a B.S. degree in Chemical Engineering from Northeastern University. From 1936 to 1951 he was associated with Lever Brothers and also with Parke, Davis & Company.

JOHN MORIARTY has joined the staff of Arthur D. Little, Inc., Cambridge, Mass. Mr. Moriarty was graduated from Tufts with a degree in biology and chemistry and worked for five years in the food technology department of M. I. T.

ERNEST W. NORDLINGER, for eight years associate editor of *Food Packer*, has joined the Putnam Publishing Company, Chicago, as assistant editor of *Food Processing*. Mr. Nordlinger was editor of the Isker-Maclinn revision of *Campbell's Book on Canning, Pickling, Preserving*. He graduated from Purdue University in 1942 and served as a staff assistant at Purdue Agricultural Experiment Station and also assisted on vegetable-dehydrating experiments conducted by the University in cooperation with the Food and Container Institute for the Armed Forces.

L. M. RICHARDSON has been appointed as Sales Manager of the Foxboro Company's Food Industries Division at Foxboro, Mass. After receiving his B.S. in Food Technology at MIT, in 1941, Mr. Richardson served five years in the Army where he was in charge of development work on packaged foods at the Subsistence and Development Laboratory of QMC at Chicago. After working with the National Tea Co. and the Beatrice Foods Co., in 1948 he joined Lever Bros. as Supervisor of the Edible Products Department.

OBITUARY

Theodore Soloski, Cereal Chemist at the QM Food and Container Institute, Chicago, Ill., died September 1

(Continued on page 6)

News of the Institute

(Continued from page 4)

after a long illness. He was 38 years old. Surviving are his wife Beatrice and sons Warren, 10, and Stephen, 7. Mr. Soloski received his B.S. in Cereal Chemistry from the University of Minnesota under the late Dr. R. A. Gortner. After graduation he was associated with Pillsbury Mills in Minneapolis for eight years and joined the Food and Container Institute in 1945. There he served as Chief of the Cereal and Baked Products Division.

U. S. EXPORTS OF FATS AND OILS IN 1950

Net exports of fats, oils, and oil-bearing materials from the United States of America in 1950 totalled about 350,000 metric tons, in terms of oil, approximately 200,000 tons less than a year earlier. Gross exports from the United States in 1950 were nearly 950,000 metric tons, between one-fifth and one-sixth of total world exports. Imports totalled about 600,000 tons.

With the U. S. demands for fats and oils materially stronger in 1950 than in 1949, movement into internal trade channels increased substantially, and prices rose more than 50% during the year. The Government purchased "strategic" oils (coconut, palm, castor, and spermwhale) for stock piling, and dealers and consumers apparently added to their stocks of fat-and-oil products in anticipation of price increases and possible shortages. Also actual consumption increased with rising consumer incomes. Even though indigenous production increased 150,000 metric tons in 1950 to a new high of nearly 5.4 million tons, imports also increased, and exports declined.

Exports of items used principally for edible purposes—mainly lard, soybeans, soybean oil, and cottonseed oil—totalled about 560,000 metric tons, in terms of oil. This was 190,000 tons less than in the exceptional year of 1949, but was larger than in most other earlier years. Owing mainly to the bumper 1949 Mediterranean crop of olives, imports of edible olive oil into the United States in 1950, at 36,000 tons, were the highest in 20 years.

Exports of industrial fats and oils, consisting almost entirely of inedible tallow, greases, fatty acids, and fish oils, reached a new peak of over 380,000 metric tons—nearly 75,000 tons more than in 1949. The principal factors behind this large export apparently were a new record output of tallow and greases in the United States, low prices for these fats in the first half of 1950, and increasing world supplies of dollar exchange.

Imports of items used mainly for industrial purposes rose to about 560,000 metric tons, in terms of oil—65,000 tons more than in 1949. The leading items in this category were copra and coconut oil, castor beans and oil, tung oil, and palm oil. The increase was due principally to strong U. S. demand, an increase in copra production in the Philippines (the major U. S. supply area), and the resumption of Chinese tung-oil exports in volume in the spring of 1950. This report is based on preliminary data published in February-March 1951 issue of The Fats and Oils Situation, U. S. Department of Agriculture, Washington, D. C., U. S. A. The export figures, for both 1949 and 1950 include about 40,000 metric tons of oil and fat, mostly lard, shipped to Puerto Rico and the Virgin Islands. [From *Food and Agr. Statistics, FAO,* 4 (4-5) April-May (1951).]

U. S. INTERIOR DEPARTMENT AND ECA ACT TO BOOST FREE WORLD SUPPLY OF ALUMINUM

Promise of important increases in the Free World's supply of aluminum has been reported by two Federal agencies.

The Interior Department reports it is studying a plan to give some 1,500 independent fabricators an opportunity to participate in ownership of proposed new production facilities in Montana and the State of Washington. The Economic Cooperation Administration announces that a new plant to produce some 40,000 tons of aluminum a year will be built in Norway with Marshall Plan counterpart funds.

Small Business Angle

The proposal before the Interior Department calls for a direct government loan of $45,000,000 to be used for the construction of an aluminum plant at Kalispell, Montana, and an alumina plant in the State of Washington. The Kalispell facilities would have an annual capacity of 108,000,000 pounds, and would be approved for an 85 percent tax amortization. Independent fabricators who subscribed to a stock offering of some $3,500,000 would have first call on the plant's output in proportion to their percentage holdings of capital stock.

Commenting on the proposal, Interior Secretary Chapman declared it was in line with the purpose of President Truman to draw a greater number of small business firms into the mobilization program. "By interesting independent fabricators in the manufacturing end of the aluminum business," Mr. Chapman stated, "the competitive base of the industry will be broadened and the nation's aluminum stockpile will be increased."

Norway Plant Planned

The new plant in Norway will be built at Sunndalsoera, with the help of $24 million in Marshall Plan counterpart funds. This is the largest single Marshall Plan advance ever made for the development of strategic defense materials, and represents about one-half the total cost of the plant, according to the ECA. Repayment of the loan and interest will be made to the United States stockpile over a ten-year period, at the rate of 7,800 tons of aluminum annually.

Equipment for the plant will be purchased in Denmark, West Germany, France and Norway, with counterpart funds from those countries. For details see Interior release July 28, 1951; ECA release 49. (From: *Defense Production Record,* August 9, 1951).

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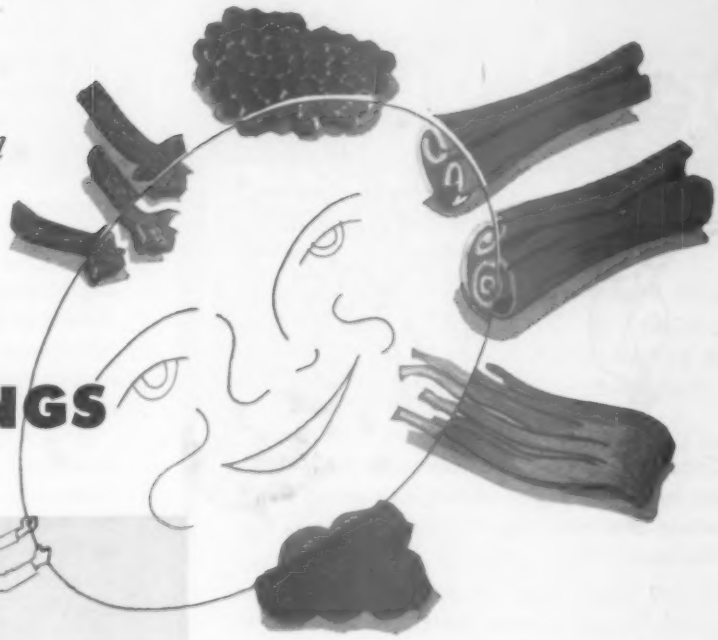

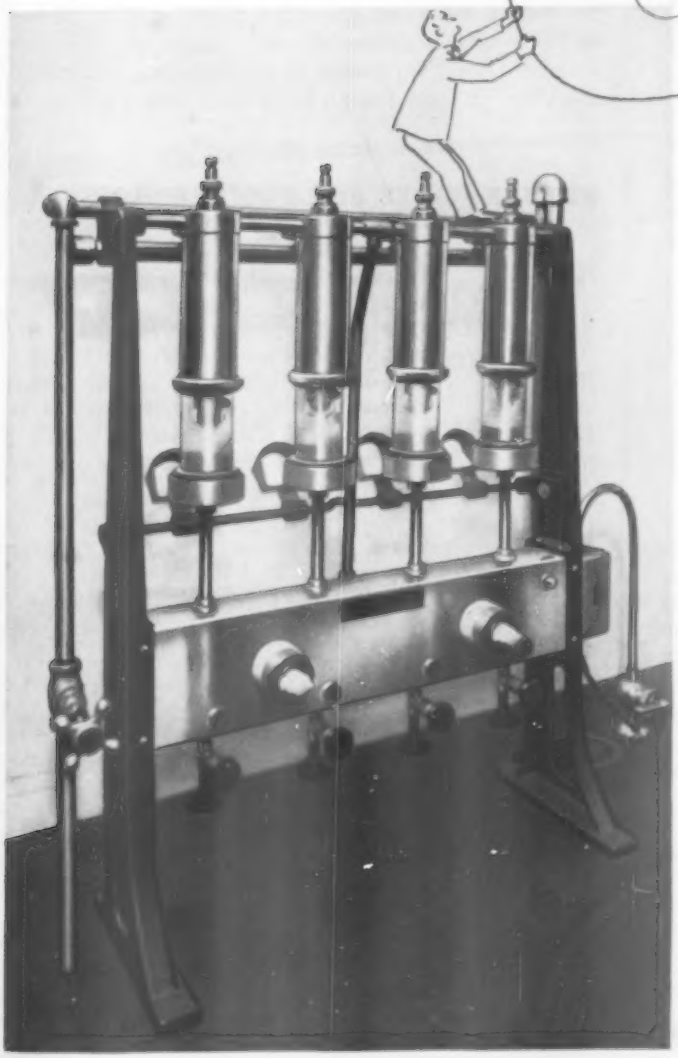

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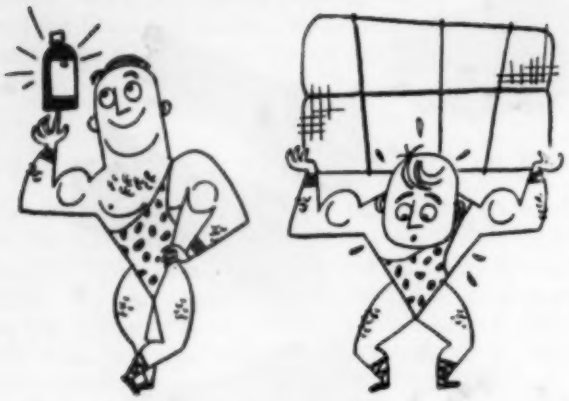

● Samson made an unshakable place for himself in history by hefting mighty objects, and strong men the world over have since labored to emulate him. But the modern food processor and manufacturer of dry and liquid seasonings is seldom naturally equipped for such activity. Therefore to transport and store the heavy, awkward bags of spices his products require, he must perforce hire warehouses, trucks and several muscular, 20th century Samsons!

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DENSITY CHARTS IN ENGLISH UNITS ON COTTONSEED AND PEANUT OIL MISCELLAS NOW AVAILABLE

Operators of oilseed solvent-extraction plants and designers of solvent-recovery equipment should welcome a new set of six charts which show technical data on the densities and gravities are related to the composition of mixtures of cottonseed and peanut oils in hexane.

The curves, which were plotted by the United States Department of Agriculture, New Orleans, La., apply over the ranges of operating temperatures used in commercial oilseed solvent-extraction and solvent-crystallization processes. The values are in English units and are based on data obtained previously but expressed in metric units. In the replotted charts, densities are in pounds per cubic foot and per gallon; temperatures in Fahrenheit; and specific gravities are on the basis of the density of water at 60 degrees.

This series of curves complements another set made available last year, which showed data in English units on the boiling point-vapor pressure-constant composition parameters of oilseed miscellas in hexane. The earlier curves were a replotting also of previous data in metric units.

The new set of charts can be obtained, without charge, from the United States Department of Agriculture, 2100 Robert E. Lee Blvd., New Orleans 19, La. They will be sent in a booklet identified as "AIC-292, Densities and Gravities of Cottonseed and Peanut Oil Miscellas in English Units," by Kenneth M. Decossas, Frederick A. Deckbar, Jr., and Joseph L. Hecker (deceased).

FUTURE DATES FOR FOOD TECHNOLOGISTS

1951

Nov. 5-8	**Refrigeration and Air Conditioning Exposition, Navy Pier, Chicago, Ill.**
Nov. 12-14	Grocery Manufacturers of America, Inc. Annual Meeting, New York, N. Y.
Nov. 12-15	**American Bottlers of Carbonated Beverages. Annual Meeting. Armory, Washington, D. C.**
Nov. 15-16	Association of Food Industry Sanitarians, Annual Meeting, Wilton Hotel, Long Beach, Calif.

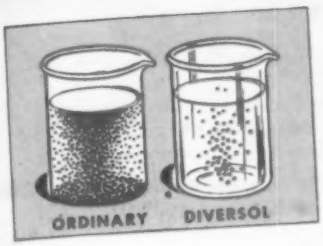
1952

Jan. 14-17	Plant Maintenance Show and Conferences, Convention Hall, Philadelphia Pa.
Jan. 16-18	Canadian Food Processors Association, Annual Convention, Chateau Frontenac, Quebec, P. Q.
Jan. 17-18	National Pickle Packers Association, Winter Meeting, Roosevelt Hotel, New York, N. Y.
Jan. 19-23	Conventions of the National Canners Association, National Food Brokers Association, and Canning Machinery and Supplies Association, Atlantic City, N. J.
March 3-7	National Association of Frozen Food Packers, Hotel Stevens, Chicago, Ill.
May 24-28	American Association of Cereal Chemists, National Convention, Chicago, Ill.
June 8-12	**Institute of Food Technologists, Twelfth Annual Meeting, Grand Rapids, Mich.**

(Information concerning future dates of national and international meetings, conventions and exhibits of interest to food technologists should be sent to the editorial office.)

TEST PROVES DIVERSOL BACTERICIDE

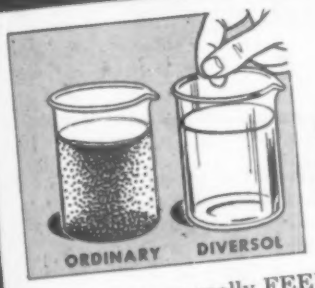
gives you superior performance 4 *ways*



1

PROOF THAT DIVERSOL DISSOLVES FASTER!

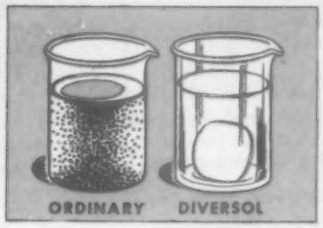
Here are drawings of actual photographs showing how rapidly and completely Diversol dissolves . . . even in cold water! Diversol dissolves completely in only 20 seconds! The other bactericide is 30% undissolved after a full half hour!



2

PROOF THAT DIVERSOL ASSURES MORE COMPLETE WATER SOFTENING!

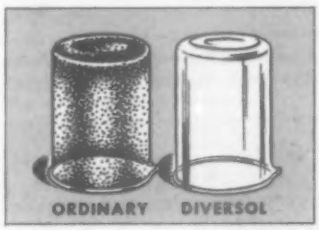
Here you can really FEEL the difference! Diversol makes even the hardest water soft—others do not soften water so completely.



3

PROOF THAT DIVERSOL PENETRATES MORE RAPIDLY!

In this part of the test, green pads coated with an invisible grease film much like that often left on equipment, are floated on top of equal solutions of Diversol and another popular bactericide. The pad in the Diversol solution becomes wetted and bleaches out in a few moments. The pad in the other bactericide solution remains unchanged even after 10 minutes! This amazing penetrating action assures complete disinfection of treated surfaces.



4

PROOF THAT DIVERSOL GIVES YOU BETTER DRAINING!

When the two beakers are emptied, you can see how amazingly clear and clean Diversol drains. Compare Diversol's free-draining action with that of the other bactericide. Notice that Diversol leaves no scum or sticky residues. Then remember, film harbors bacteria!

Furthermore, Diversol is uniform, stable, safe, easy to use, economical, approved! So be sure to be safe . . . USE DIVERSOL . . . THE KING OF THEM ALL! Let your Diversey D-Man show you this amazing 4-way test!

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Selected Abstracts[a]

ANALYTICAL METHODS

A colorimetric method for determining small amounts of trichloroethylene in vegetable oils.

EISDORFER, I., AND MEHLENBACHER, V. C. *J. Am. Oil Chemists' Soc., 28,* 307-10 (1951).

An accurate method for detg. small amts. of trichloroethylene in vegetable oils has been presented. The method employs a distn. procedure to sep. the trichloroethylene from the oil and a colorimetric procedure based on the Fujiwara reaction to det. the trichloroethylene in the distillate. The method has been tested on known samples of crude and refined soybean and cottonseed oils varying in trichloroethylene content from 0.001% to 0.6% with excellent results.

The determination of fat in foods.

STOLDT, W. *Deut. Lebensm. Rundschau, 47,* 13-15 (1951); *J. Am. Oil Chemists' Soc., 28,* 320 (1951).

For the detn. of total fat it is necessary to treat the material first with a mixt. of 60 cc. HCl (1.19) and 100 cc. water. The soln. is filtered and the filter paper and fat are dried and extd. with ether. The latter is evapd. and the residue dried and weighed as total fat. This method and the direct extn. methods in use were applied to a no. of dairy products and cocoa, and comparative results tabulated.

BIOLOGICAL SCIENCES

BIOCHEMISTRY

The influence of pressure on the rates of biological reactions.

LAIDLER, K. J. *Arch. Biochem., 30,* 226-35 (1951).

Experimental data were analyzed in order to explain the influence of pressure on low-temp. enzyme reactions, for both inhibited and noninhibited systems. The vol. changes in these reactions are the opposite of those found in non-biological systems and suggest an unfolding and refolding of the enzyme as the reaction proceeds. The data suggest that noncompetitive inhibitors combine with the enzyme without an appreciable vol. change, but that with competitive inhibitors there is a vol. increase. This view is supported by both the low- and high-temp. behavior.

A toxicological study of some polypropylene (polyoxypropylene) glycols.

SHAFFER, C. B., CARPENTER, C. P., CRITCHFIELD, F. H., NAIR III, J. H., AND FRANKE, F. R. *Arch. Ind. Hyg., 3,* 448-53 (1951).

Three polypropylene glycols of mean mol. wts. of 425, 1025, and 2025, respectively, have been studied. These exhibited considerably acute toxicity by the oral, intravenous, and intraperitoneal routes, as compared with propylene glycol and the polyethylene glycols. Toxicity was greatest in the case of the compd. of intermediate mol. wt. (1025). Lethal single doses administered to rats produced hyperexcitability of the central nervous system, as evidenced by tremors or convulsions, with death occurring from respiratory arrest during convulsive seizures. The toxicity of these compds. by the cutaneous and respiratory routes was low. Skin irritation was minimal, and eyes were not injured by the undild. materials.

Chronic toxicity of the methylpolysiloxane "DC antifoam (R) A" in dogs.

CHILD, G. P., PACQUIN, H. O., AND DEICHMANN, W. B. *Arch. Ind. Hyg., 3,* 479-82 (1951).

"DC antifoam(R) A," a methylpolysiloxane, ingested in doses of 0.3, 1.0 or 3.0 g. per kilogram of dog five days a week for a period of six months did not produce signs or symptoms of toxicity. Mild effects noted were restricted to "chewing" after nearly every "antifoam" meal, and egestion of a moist or loose stool. Specific gross or microscopic pathol. changes were not observed with the exception of a deposit of bile in the Kupffer and hepatic cells. The significance of the latter observation is at present not understood. Traces of "DC antifoam(R) A" which may be absorbed from time to time by human subjects should prove to be entirely harmless.

NUTRITION

How nutritious are city diets?

CLARK, F., AND COLVIN, E. *Agr. Situation, 35,* 11-12 (1951).

It was found that on the average city families in the United States are well fed. The food brought into kitchens provided average quantities of protein, calcium, iron, and five well-known vitamins equal to or well above the yardstick of the National Research Council's recommended nutrient allowances. When the nutritive content of each family's food was compared with the NRC's recommendation, however, many families were found to have diets short in one or more nutrients. Calcium was most likely to be short in diets. Next came vitamin C and several of the B vitamins.

Onions can cause anemia.

KALSER, M., IVY, H. K., MAGEE, D. F., AND IVY, A. C. *Science News Letter, 59,* 290 (1951).

Anemia was induced in human subjects by eating 2 pounds of cooked onions a day in addn. to their regular diet. The active hemolytic principle appears to be in the onion oil.

Utilization of vitamin A and carotene by the rat. I. Effects of tocopherol, tween and dietary fat.

BURNS, M. J., HAUGE, S. M., AND QUACKENBUSH, F. W. *Arch. Biochem., 30,* 341-6 (1951).

When 1.0 mg. of α-tocopherol was fed daily, no consistent significant difference was observed in potency between 1.0 μg. vitamin A and 1.0 μg. β-carotene. Dispersal of the vitamin supplement in an aq. medium with polyoxyethylene sorbitan monopalmitate ("Tween 40") diminished the efficiency of utilization of vitamin A but seemed to increase slightly that of β-carotene. "Tween 40" had no significant effect when added to the diet without emulsification. The optimum daily dose of α-tocopherol was close to 1.0 mg. for β-carotene. A daily dose of 2.0 mg. of tocopherol diminished the efficiency of utilization of β-carotene significantly. The fat content of the diet influenced the utilization of vitamin A and β-carotene. Both were more effective when fed with a diet contg. 5% lard than with a diet which contd. no fat but was supplemented with 0.1 g. of refined corn oil daily.

Utilization of vitamin A and carotene by the rat. II. Effects of mineral oil and fat content of diet.

BURNS, M. J., HAUGE, S. M., AND QUACKENBUSH, F. W. *Arch. Biochem., 30,* 347-50 (1951).

Small amts. of mineral oil, as little as 0.08% in the diet, diminish the utilization of β-carotene. The effect on vitamin A was not so great as that on β-carotene; however, the decrease in growth was significant for the 0.16% level of mineral oil. Increasing the dietary fat from 5% to 10% did not improve the utilization of vitamin A or carotene in the presence of mineral oil at a level of 0.32% in the diet.

The effect of feeding aureomycin on the vitamin B_{12} requirement of the chick.

OLESON, J. J., HUTCHINGS, B. L., AND WHITEHILL, A. R. *Arch. Biochem., 29,* 334-8 (1950).

The interdependence of the growth effects of vitamin B_{12} and aureomycin in the chick have been studied. Each factor appears to have a sparing action on the other. The limiting amt. of vitamin B_{12} has been detd., while the minimal amt. of aureomycin is less than the 5 mg./kg. used. Rats appear to react to the stimulatory effect of antibiotics incorporated at low levels in their feed.

The effect of removing supplemental aureomycin from the ration on the subsequent growth of chicks.

BERG, L. R., BEARSE, G. E., MCGINNIS, J., AND MILLER, V. L. *Arch. Biochem., 29,* 404-07 (1950).

The action of the antibiotic is limited to the time the material is being fed, and it is not stored in the body.

(Continued on page 12)

[a] These Selected Abstracts are made available to FOOD TECHNOLOGY through the cooperation of Associate Editor Aksel G. Olsen and the General Foods Corporation of New York, N. Y. The abbreviations found in these abstracts are similar to those used by Chemical Abstracts.

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	Pectin esterase	Experimental	Demethoxylates pectin without hydrolysis of the galacturonic acid chain. pH range 3.5-5.
Proteolytic	RHOZYME P-11	Commercial	Hydrolyze proteins to peptides and amino acids. pH ranges 5.5 - 8.5 (Relative amounts of peptides and amino acids will differ for each proteolytic enzyme.)
	Protease 15	Experimental	
	Protease 16	Experimental	
Amylolytic	RHOZYME S	Commercial	Hydrolysis of starch to dextrins, maltose and glucose. Contain both an alpha amylase and a strong glucogenic principle. pH range 5-6. RHOZYME S is a purified enzyme; RHOZYME T-22 the crude product.
	RHOZYME T-22	Commercial	
	RHOZYME DX	Commercial	Hydrolysis of starch to dextrins. Heat stable. pH range 5.5-6.5.
Lactase	Lactase B	Experimental	Hydrolysis of lactose to glucose and galactose. pH range 6.1-7.5.

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Abstracts

(Continued from page 10)

The growth promoting effects of various antibiotics on pigs.

LUECKE, R. W., THORP, JR., F., NEWLAND, A. W., AND MCMILLEN, W. N. *J. Animal Sci., 10,* 538-44 (1951).

Addn. of streptomycin to diets of pigs at 10 mg. per lb. of feed proved ineffective in promoting growth. Good results were, however, obtained with aureomycin, procaine penicillin and a dried APF product contg. aureomycin.

A comparison of aureomycin, streptomycin, penicillin and an auromycin-B_{12} feed supplement for the pig.

CUNHA, T. J., MEADOWS, G. B., EDWARDS, H. M., SEWELL, R. F., PEARSON, A. M., AND GLASSCOCK, R. S.

The data reported indicate that penicillin, at the levels used, was of no benefit in growth; whereas streptomycin stimulated growth to a small extent but not as much as aureomycin. The resultes indicate that the growth-promoting effect with various antibiotics will vary with the species of animal and the nature of the basal diet employed.

Cobalt metabolism studies with sheep.

KEENER, H. A., BALDWIN, R. R., AND PERCIVAL, G. P. *J. Animal Sci., 10,* 428-33 (1951).

It was found, using labeled cobalt in the form of the sulphate, that very small amts. of injected cobalt do reach the rumen. When fed per os, labeled cobalt in the form of the carbonate was found to be adsorbed in appreciable quantities as indicated by its presence in the blood and urine.

Iron metabolism in the cobalt-polycythemic rat.

BERLIN, N. I., HUFF, R. L., AND HENNESSY, T. G. *J. Biol. Chem., 188,* 445-50 (1951).

In both normal and polycythemic rats, 1% of the iron in the red blood cells is turned over per day, which is equivalent to a mean life span of the red blood cell of 100 days. Cobalt does not accelerate the processes of maturation of the red blood cells which involve the incorporation of iron.

Feeding tests with some algin products.

NILSON, H. W., AND WAGNER, J. A. *Proc. Soc. Exptl. Biol. Med., 76,* 630-5 (1951).

The following three algin products were fed to animals at 5, 10, and 15% by wt. of diet for ten weeks.: (1) Dariloid, a sodium alginate standardized with sugar and dextrin and treated with phosphate to make it sol. in milk, used in ice cream as a stabilizer. (2) Kelgin, a sodium alginate, used in foods as a stabilizer, thickener or gel-former and in pharmaceuticals. (3) Kelcoloid, a propylene glycol alginate used as an emulsifier, bodying agent and stabilizer in foods such as French dressing and in pharmaceuticals. Data indicate that these products are free from substances which adversely affect health when fed at levels at least 10 times higher than when used in foods or pharmaceuticals. Difficulty of feeding at higher levels was attributed to the phys. texture imparted to the diets, a problem which would not occur in com. use.

FOOD PRODUCTS

BAKING AND BAKERY PRODUCTS

Emulsifier trends sharply up—food uses.

SANDERSON, J. P., AND ABEL, F. K. *Chem. Ind. Week, 68,* 21-2, May 26, 1951.

The types of edible emulsifiers in use today are listed. Advantages of using these compds. along with the methods that are usually used, are given. A few uses of emulsifiers are listed which show their application outside the baked goods field.

FRUIT AND VEGETABLES

Variation in individual Valencia oranges from different locations of the tree as a guide to sampling methods and spot picking for quality. I. Soluble solids in the juice.

SITES, J. W., AND REITZ, H. J. *Proc. Am. Soc. Hort. Sci., 54,* 1-10 (1949); *Brit. Abstracts, BIII,* 438 (1950).

Sol. solids in the fruit juice increased with increasing height in the tree and were greater for "outside" than for "inside" fruit, and less in the north-east portion of the tree than in the remaining sectors. Rind color and sol. solids were correlated, high sol. solids being assocd. with orange and yellow rind colors.

Use of isopropylphenylcarbamate to reduce sprouting of potato tubers during storage.

RHODES, A., SPENCER, L. G., AND TEMPLEMAN, W. G. *Research, 3,* 189 (1950); *Food Sci. Abstracts, 23, 252,* No. 1056 (1951).

Isopropylphenylcarbamate (IPPC), as well as some esters of known plant growth regulators, were examd. on a lab. scale; the action of IPPC was also compared with that of methyl α-naphthylacetate (MANA) under field clamp conditions. The results showed that IPPC was much superior to MANA in reducing the sprouting of tubers, and a 1% IPPC dust under field conditions gave excellent results. While the method is primarily of practical importance for the long keeping of ware potatoes, its use on seed potatoes does not appear to be ruled out. Exposure to air may rapidly destroy the sprout-inhibiting effect. Extensive toxicity tests are now in progress.

GELATIN

Solubility of gelatin in cold water.

POURADIER, J. *Compt. rend. 230,* 1466-7 (1950); *Brit. Abstracts, AI,* 504 (1950).

Measurements of η_{sp}, show that, contrary to some hypotheses, the mol. structure and dimensions of the gelatin dissolved by cold H_2O do not differ markedly from those of the original substance.

LEGISLATION

Economic aspects of food standards.

AGATA, B. C. *Food Drug Cosm. Law J., 6,* 437-53 (1951).

A discussion of some of the methods to aid the consumer in a wise choice of food purchases. Difficulties in choosing the factors to be measured and in deciding which ones are desirable, plus the problem of educating the consumer as to the meaning of the grade designation, present serious obstacles to an effective program of grade labeling. On the other hand, the descriptive label using common, self-explanatory terms whose meanings will be uniform on all labels can help to solve the problem of informing the public, and it is not subject to many of the objections raised against grade labeling.

MCA suggests FDA certification of food chemicals before use.

Chem. Eng. News, 29, 2741 (1951).

Prior certification by the FDA of new chems. for use in foodstuffs was suggested by the Mfg. Chemists' Assocn's committee on chems. in foods at a conference as a satisfactory means of safeguarding the public. MCA believes that prior certification is a sounder approach to the problem than another alternative such as the Miller bill. Basically, the Miller bill would require FDA to certify chems. before they are sold in food on the basis of toxicological data on the chems. alone. Thus, the FDA ruling would then be based on the safety of the chem. per se instead of on the safety of each food incorporating the chem.

PATENTS

GREAT BRITAIN

Recovery of pectic products from vegetable matter.

A. S. P. CHEM. CO. LTD. 640,101, May 12, 1947; *Brit. Abstracts, BIII,* 514 (1950).

Pectic material is extd. from vegetable matter with a soln. of alkali or NH_4 salt having a neutral or alk. reaction, and is then pptd. by bringing the pH to between 4 and 2.5.

Stabilisation of edible and potable substances against oxidation.

NYROP, J. E. 640,241, Mar. 1, 1946; *Brit. Abstracts, BIII,* 517 (1950).

Edible or potable products contg. org. materials, e.g., butter, cream, coffee exts., etc. are stabilized against oxidation by addn. of 0.1-2% of the product formed (optionally in situ) by interaction of a fermentable carbohydrate (a hexose) with an inorg. phosphate in presence of a yeast enzyme (press juice). In an example, ext. of coffee is mixed with hexose-phosphoric acid (1% on dry matter), then sprayed into a current of hot air, to give a brown powder which, after storage during a prolonged period, retains the flavor of the original ext. when dissolved in water.

(Continued on page 18 following technical papers)

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Abstracts

(Continued from page 12 preceding technical papers)

UNITED STATES

Preparation of baking mixes.

SALO, P. W., AND HUBER, L. J. Assignors to General Mills, Inc. 2,555,902, June 5, 1951.

Process of making a prepd. baking mix contg. finely divided cereal material and solid shortening which comprises subdividing the shortening into relatively small particles of substantially uniform size at least two dimensions of which are in the range of ⅛ to ½ inch, incorporating the relatively small particles in the finely divided cereal material, and further reducing the relatively small particles in size while admixed with the finely divided cereal material.

Process for making oat cereal flake.

LILLY, E. F., AND RUPP, E. G. Assignors to The Quaker Oats Co. 2,552,290, May 8, 1951.

A process of making blistered, toasted and friable oat flakes capable of maintaining their tenderness, crispness, and crunchiness after being mixed with cold aq. fluids such as cream or milk which comprises mixing oat flour with water in proportions to form a dough, cooking dough under pressure with simultaneous kneading until a noncrumbling coherent cooked dough is formed, then partially drying the dough under vacuum, thereafter forming the resulting mass into flakes of a desired thickness, and toasting the flakes at an elevated temp. to produce the blistered product.

Oat food process.

RUPP, E. G. Assignor to The Quaker Oats Co. 2,552,291, May 8, 1951.

A process of prepg. a cooked oat food product contg. oat grain components as its essential ingredient and characterized by its improved flavor and palatability which comprises defatting milled oat components by solvent extn. substantially to reduce the fat content thereof, sepg. solvent from the defatted product, and cooking the defatted product with water at a temp. at least equal to that of the boiling temp. of water.

Method of producing starch.

EDKERS, C. G. Assignor to Aktiebolaget Separator. 2,556,322; June 12, 1951.

In the production of starch, particularly maize starch, in which a suspension of water, fibres, starch grains and undissolved proteins is centrifugally sepd. into a component comprising water and the main portion of the proteins and part of the starch, and a second component comprising a starch concentrate and some entrained impurities, the improvement which comprises subjecting the starch concentrate to a mech. disintegrating action to at least partially disintegrate and liberate cell parts and protein agglomerates accompanying the starch grains, and subjecting the concentrate thus treated to a sepg. operation to remove solid impurities from the starch.

Starch gluten separation.

VON EDESKUTY, J. J., AND ZALAR, J. F. Assignors to General Mills, Inc. 2,555,908, June 5, 1951.

App. for sepg. starch from gluten in a dough, comprising a trough disposed at an angle to the horizontal, an interlocking screw conveyor disposed in trough, a discharge opening for gluten at the upper end of the trough, an inlet for wash water near the upper end of the trough, and a discharge opening for starch slurry near the lower end of the trough and disposed above the level of the interlocking screw conveyor.

Method for separating starch and gluten.

KILANDER, A. K. Assignor, by mesne assignments, to Trenton Chemical Co. 2,557,032, June 12, 1951.

In the process of producing gluten and alc. from durum wheat the steps which comprise mixing durum wheat flour with about an equal amt. of ordinary type wheat flour, admixing mixed flours with water carrying some fine gluten particles to make a dough of about equal parts of water and flour, feeding and mixing the dough, further feeding the dough from a delay pool beyond first feeding and mixing, again feeding the dough beyond a second delay pool, adding the dough to further water after a delay in a third delay pool, agitating the dough-water mixt. to

(Continued on page 20)

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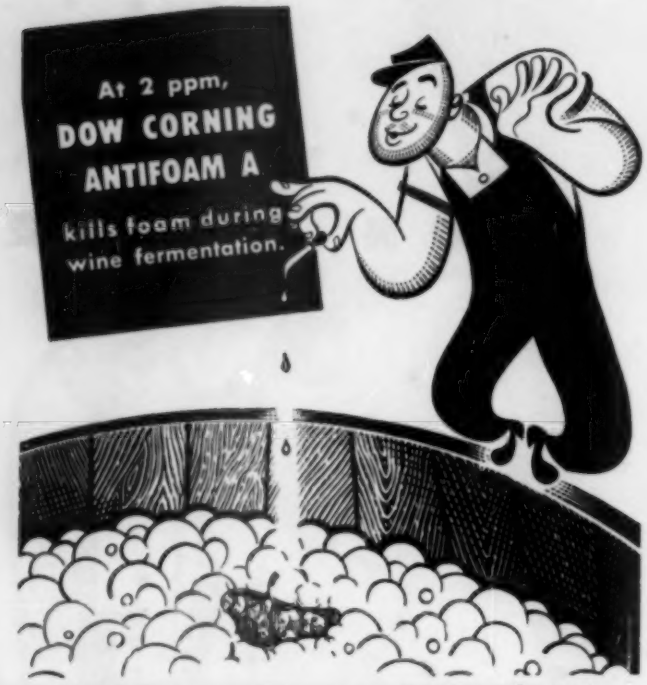

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Abstracts

(Continued from page 18)

form agglomerates of gluten adapted to be retained on a thirty-mesh sieve, sepg. out the gluten by sieving the mixt. and sending the sepd. starch water to fermentation and rectification.

Chocolate casting machine drive.

AASTED, K. C. S. 2,551,992, May 8, 1951.

In app. for casting chocolate and other molded foodstuffs including a material holding container having a nozzle for dispensing the material and a reciprocable plunger operable in container for effecting discharge of the material therefrom, in combination, a primary driving shaft having cam followers mounted thereon, driven cams engageable with cam followers to effect rotational movement of driving shaft, a secondary driving shaft, a backlash unit comprising a cam disc member having a slot of predetd. configuration and a cam follower pin member engageable in slot, one of members being rigidly connected to the secondary driving shaft, linking means connecting the other of members to plunger to reciprocate plunger in response to the movements of back-lash unit member, and adjustable connecting means between primary driving shaft and secondary driving shaft, connecting means comprising an adjusting member for changing the relative phase-displacement of primary driving shaft and secondary driving shaft, whereby to adjust the relative position of follower pin in slot.

Beverage and process of making the same.

BOYLES, F. M. Assignor to Cloverdale Spring Co. 2,556,792, June 12, 1951.

A stable drink comprising cocoa butter present as the dispersed phase of an emulsion in an aq. liquid medium, dispersed phase of the emulsion also including bromine chemically combined with constituent of dispersed phase, the sp. gr. of dispersed phase being substantially equal to the sp. gr. of the drink.

Food compositions.

BOGIN, H. H., AND FEICK, R. D. Assignors to Parke, Davis & Co. 2,555,466, June 5, 1951.

A sol. coffee product comprising an intimate mixt. of a normally hygroscopic powdered coffee product and polyvinyl alc.

Fatty food compositions and method of making same.

BOGIN, H. H., AND FEICK, R. D. Assignors to Parke, Davis & Co. 2,555,467, June 5, 1951.

A dry, stable, non-toxic, greaseless solid fat food product comprising an intimate mixt. of a normally greasy fat food product and a cellulose deriv. of the class consisting of methyl cellulose and an alkali metal salt of carboxyl-methyl cellulose.

Fatty food compositions and method of making same.

BOGIN, H. H., AND FEICK, R. D. Assignors to Parke Davis & Co. 2,555,468, June 5, 1951.

A dry, stable, non-toxic, greaseless solid fat food product comprising an intimate mixt. of a normally greasy fat food product and polyvinyl alc.

Oil produced from eggs.

COOPER, W. B. 2,555,731, June 5, 1951.

A method of producing oil from fowl's eggs comprising the steps of hard boiling the eggs, removing the hard-boiled yolks from the eggs, and substantially completely reducing yolks in the presence of a liquid starting and accelerating agent to an oily liquid by rendering the same in a vessel by heat.

Stabilization of organic compounds.

ROSENWALD, R. H. Assignor to Universal Oil Products Co. 2,555,509, June 5, 1951.

An org. compd. selected from the group consisting of motor fuel, styrene and edible fats and oils tending to deteriorate contg., as an inhibitor for deterioration less than 1% by wt. of a hydrocarbon dinitroso compd. in which the nitrogen atoms are attached to adjacent carbon atoms.

Ice-cream stabilizer.

GLABE, E. F. Assignor to *Food Technology, Inc.* 2,555,849, June 5, 1951.

A stabilizing compn. for ice cream consisting essentially of approx. 7.65% by wt. of carboxymethylcellulose, approx. 3.85% Irish moss ext., approx. 38% soya whipping protein, approx. 4.60% potassium bicarbonate, approx. 19.00% sodium citrate, and approx. 64.52% partially refined corn starch having a small

proportion of protein therein, bicarbonate and citrate being present in a quant. sufficient to ppt. the sol. calcium and magnesium from the ice cream mix.

Carragheenate arabate coazervate and method of manufacture.
LE GLOAHEC, V. C. E. Assignor to Algin Corp. of America. 2,556,282, June 12, 1951.

The coazervate product of interaction in an aq. medium at a pH between about 6 and about 10 between a carragheenate and an arabate, at least about 90% by wt. of the total cation content of carragheenate plus arabate consisting of sodium.

Preservation of food products.
JENSEN, L. B., AND HESS, W. R. Assignors, by mesne assignments, to Swift & Co. 2,550,253, Apr. 24, 1951.

In the process of treating food products subject to deterioration by food spoiling and food poisoning bacteria, the step of adding to the food product a small amt. of an antibiotic consisting essentially of a non-toxic antibiotic material of a higher plant derived therefrom by treatment with a non-aq. org. solvent whereby antibiotic material is retained in the food product in sufficient amt. to inhibit bacterial growth.

Coated food.
IRVINE, A. E. Assignor, by mesne assignments, to Union Carbide and Carbon Corp. 2,556,278, June 12, 1951.

A coated edible product comprising a processed meat product of a type normally subject to dehydration totally enclosed and hermetically sealed in a continuous coating comprising a microcryst. hydrocarbon wax having a melting point of 150° to 170° F. and contg. from 1 to 4% by wt. of the total compn. of polyethylene having an average mol. wt. between 10,000 and 30,000.

Flavoring compositions and method of making same.
BOGIN, H. H., AND FEICK, R. D. Assignors to Parke, Davis & Co. 2,555,464, June 5, 1951.

A solid flavoring product comprising an intimate mixt. of a normally liquid, volatile and unstable flavoring material and polyvinyl alc.

Flavoring compositions and method of making same.
BOGIN, H. H., AND FEICK, R. D. Assignors to Parke, Davis & Co. 2,555,465, June 5, 1951.

A solid flavoring product comprising an intimate mixt. of a normally liquid, volatile and unstable flavoring material and an alkali metal salt of carboxymethyl cellulose.

Process for flavoring foodstuffs.
STOKLA, H. K., AND VAN DALFSEN, J. Assignors to Lever Brothers Co. 2,556,233, June 12, 1951.

A process for flavoring powdered foodstuffs which are prepd. for use by treating with aq. liquids, during which heat may be applied, which comprises dispersing a flavoring substance in a liquid stiffener in which the substance is substantially insol. and distributing the dispersion so obtained into particle form before the dispersion is completely hardened, whereby the dispersed substance is coated with liquid stiffener, and distributing unhardened particulate dispersion into the foodstuff, whereby the particles of the dispersion are coated with the powdered foodstuff to be flavored, particles mostly having a minimum size of not less than 0.1 mm. and not more than 3.0 mm.

Method of freezing food.
MORRISON, W. L. 2,555,502, June 5, 1951.

The method of packing and shipping foodstuffs and the like which consists in loosely assembling a plurality of insulated metallic diffuser boxes, each of which is substantially filled with the food to be frozen in an insulating shipping receptacle, there being clearance between adjacent diffuser boxes for the passage of refrigerating fluid, then flowing refrigerating fluid over all of the diffuser boxes from top to bottom, withdrawing the refrigerating fluid from the bottom of the shipping receptacle and continuing this process until the contents of the diffuser boxes has frozen and the freezing of the contents has expanded the boxes to decrease the clearance between and cause contact between adjacent boxes, then withdrawing the refrigerating fluid from the shipping receptable and closing it with the diffuser boxes and their frozen contents therein, for shipping and storing.

Juicer.
HAGERTY, H. W. 2552,171, May 8, 1951.

In a juicer, a press bottom comprising a pair of pivoted receptors, each provided with a pivot and having an upwardly

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DIAMOND CRYSTAL Antioxidant SALT

Abstracts

directed separator, a knife above and in line with the separators, a press head divided and shaped to straddle the knife and to cooperate with the receptors, a press rod reciprocating and manipulating the press head, a pair of cam surfaces on the pivot of each receptor, pivotally supported cam surfaces on the press rod which on the upward stroke of the press rod engage one of the cams on each receptor pivot and deflect the separator for dumping and which on the down stroke pivotally yield and pass the receptor cams without effect, and a second pair of cams on the press rod below the first which engage the other cams on the receptor pivots toward the end of the up-stroke and which pass the cams on the receptor pivots without effect on the down stroke.

Fruit juicer extractor.

DE ROCHER, A. H. 2,556,996, June 12, 1951.

In combination in a fruit juice extractor of the character described, a rotor mounted for rotation on a vertical axis and having a spiral groove formation on the periphery thereof, a presser housing cooperating with the rotor and affording a gradually upwardly diminishing pressing chamber in cooperation with the rotor, and means dividing chamber into a plurality of pressing zones and comprising live stop structure adapted to run in spiral groove formation, live stop structure including respective trains of stop rollers and structure for guiding the rollers in a working cycle of movement as impelled by the screw action of spiral groove formation.

Method and apparatus for drying glues.

ZEIGLER, A. H., AND HARRIS, JR., C. M. Assignors to Armour and Co. 2,556,247, June 12, 1951.

In a process for drying glue in which a film of glue liquor is supplied to a heated drying roll and the film, after the removal of some moisture therefrom, is removed from the roll under tension and at an angle to roll, the step of directing a stream of air against angle portion of the film.

Deliming and deswelling hides with beet sugar molasses waste liquor extract.

HEINEMANN, F. 2,556,649, June 12, 1951.

The deliming and deswelling of unhaired hides and skins with a compn. essentially consisting of an aq. mixt. of the amphoteric betaine, the org. bases: xanthine, hypoxanthine, and guanidine, and the weak org. acids: formic, acetic butyric, propionic, valeric, and lactic acid, mixt. being directly obtained from beet sugar molasses waste liquor.

Process for preparing dried molasses.

SARGENT, E. O. 2,556,111, June 5, 1951.

The process for prepg. a molasses in a pure dried, particle form which consists in mixing water with a molasses chilling the resultant mixt. to a temp. of between 26° F. to 40° F., drying the mixt. to remove excess moisture therefrom, and then grinding the dried mixt. into particles.

Process for the treatment of citrus peel.

FORKNER, J. H. 2,556,579, June 12, 1951.

In a process for the treatment of citrus peel, the steps of subjecting the peel to disintegrating and wet washing operations to remove the bulk of bitter skin components and to provide a hydrous pulp for further treatment, cooking and concg. the pulp while subjecting it to a partial vacuum, adding sugar to the pulp, and then treating the pulp to crushing and aeration to disperse remaining pockets of bitter components homogeneously throughout the mass.

Method of testing pectic substances.

LEO, H. T., AND TAYLOR, C. C. 2,557,053, June 12, 1951.

In the method of demethoxylating pectin by the action of pectase in an aq. disperson of pectin having a pH of at least 5.3 maintained by the addn. to dispersion of calcium carbonate to form a series of partially demethoxylated pectinic acids having varying jelly-making properties, the method of detg. the

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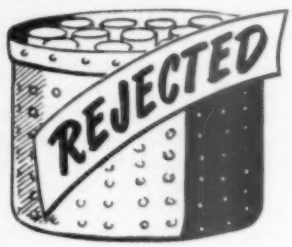

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progress of the demethoxylation reaction which comprises removing a sample of non-water-dispersible partially demethoxylated pectin contg. calcium from the reaction mixt., incrementally incorporating with sample an acid soln. that forms a water-sol. calcium salt, and detg. the pH at which dissolution of sample just takes place, pH being characteristic of the calcium susceptibility and jelly-making characteristics of pectinic acid.

Production of jellies made from mixtures of sugar and fruit juices containing pectin.

HASSID, N. J. 2,557,050, June 12, 1951.

A method of making a jelly which comprises prepg. a jelly forming soln. of pectin, sugar and acid, disposing soln. in a shallow layer of less than 1" in thickness and reducing the water content of the soln. by evapg. at a temp. lower than the b. p. of the soln., and continuing the evapn. until the jelly so formed has an m.p. higher than 210° F. and a tensile strength of over 20 grams per sq. cm.

Subtilin-pectin derivative.

OWNES, H. S., AND MACLAY, W. D. Assignors to the U.S.A. 2,555,364, June 5, 1951.

A water-sol. complex of subtilin and pectin in which the pectin is in the proportion of about 5 to 15 parts of pectin to 1 part of subtilin, being at least about 50 times as water-sol. as subtilin.

Method and apparatus for refining salt or other soluble substances.

HOPPER, C. M., AND RICHARDS, R. B. Assignors to International Salt Co. 2,555,340, June 5, 1951.

The method of refining salts or other sol. substances which comprises circulating salt soln. through a closed system, in one zone heating the salt soln. by direct contact with compressed vaporized solvent, passing the heated salt soln. at a first predetd. temp. through a second zone contg. impure salt thereby satg. salt soln. maintaining the salt soln. at a pre-detd. pressure in first and second zones, passing satd. salt soln. into a third zone maintained at a second predetd. pressure less than first predetd. pressure thereby vaporizing a part of the solvent and reducing the soln. temp. below first predetd. temp. to simultaneously crystallize purified salt out of soln. during evolution of vapor, collecting the purified salt, compressing the vaporized solvent to first predetd. pressure, removing the residual salt soln. from the collected purified salt, subjecting the removed residual salt soln. to the pressure maintained in first zone, returning the residual salt soln. to first zone and supplying the compressed vaporized solvent to first zone for increasing the temp. of residual salt soln.

Apparatus for treating vegetables with hot water and steam.

ALLAN, E. 2,556,385, June 12, 1951.

In an app. for scalding vegetables in bulk, the combination of a housing comprising a steam space closed at the top and open at the bottom, a tank of water at the bottom of housing into which steam space opens, a water column enclosed in housing at each end of the steam space, the water in column being open at the top and opening at the bottom into tank of water, the water in columns exerting pressure on the steam in the steam space through tank of water, a pipe in the steam space near one end thereof extending up through the top of the steam space and discharging into the water of the adjacent water column under the surface thereof, pipe having its lower end beveled with a bevel opening.

Hastening sprouting of dormant buds.

DENNY, F. E. Assignor to Boyce Thompson Institute for Plant Research, Inc. 2,556,523, June 12, 1951.

The method of treating dormant buds to hasten sprouting which comprises contacting the buds with a compd. of the group consisting of benzotriazole and its benzene ring substituted methyl, chloro- and nitro-derivs. dispersed in a carrier medium.

Method of packaging.

FAIRBANK, B. A. Assignor to Dewey and Almy Chem. Co. 2,555,585, June 5, 1951.

The method of packaging filleted fish in impermeable envelopes and of producing uniform packages thereof suitable for quick-freezing which consists in arranging the fish in a rigid supporting structure, removing one wall of the structure, placing the structure in a rotable fixture with the open end of the structure directed away from fixture, sliding an impermeable

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Abstracts

bag over both fixture and supporting structure, placing a second rigid supporting structure over fixture, bag and supporting structure, rotating the entire assembly one-half a revolution about the axis of the fixture whereby the bag and its contd. load is supported by the second named supporting structure, then withdrawing second named supporting structure from the fixture and first named supporting structure and subsequently sealing the bag while retaining the shape of the package.

Call For Research Papers

1952 Annual Meeting, Institute of Food Technologists Grand Rapids, Michigan, June 8-12

Regulations governing the presentation of papers at the research sessions are as follows:

1. **Deadline for titles and abstracts.** Titles and abstracts should be sent in only when the author(s) expects to actually present the paper at the Meeting. Titles and abstract(s) must be in before January 1, 1952.
2. **Length of abstracts.** Abstracts must be limited to 250 words. If longer ones are submitted, they will be shortened by the committee in charge.
3. **Character of abstract.** The abstract should be short, concise, but complete. It should outline the problem under investigation and give a brief summary of the results and conclusions.
4. **Manuscript.** The manuscript should be of such character as to be acceptable for publication in FOOD RESEARCH or FOOD TECHNOLOGY. Twenty minutes will be allowed for the presentation at the Annual Meeting. The IFT will have first claim on all manuscripts and authors desiring to publish manuscripts elsewhere will be required to secure written permission from the Editor of the Institute's journals. It is suggested that the pamphlet "Information and suggestions to authors" be consulted in the preparation of the manuscript. This pamphlet may be obtained, upon request, from the editorial offices of FOOD TECHNOLOGY and FOOD RESEARCH.
5. **Projection apparatus, etc.** If projection apparatus or other special arrangements are needed for the presentation of papers, this information must be provided with the abstract.

Thus the following information should be provided by authors who expect to present research papers at the 1952 Annual Meeting: Title of paper; author(s)' name, agency or firm and department and address; special equipment needed (standard or 35 mm. slides, 8 or 16 mm. motion picture, delinascope, blackboard, etc.), and the abstract.

This information should be sent to the
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DAVIS, CALIFORNIA

U. S. PACK OF CANNED CLAMS AND CLAM PRODUCTS, 1950

Canned clams and clam products packed in the United States during 1950 amounted to 1,518,719 standard cases, valued at $10,839,889 to the canners. This was an increase of 332,659 standard cases and $2,060,871 as compared with the previous year's production. Compared with 1949, the 1950 pack of whole and minced clams was 50 percent greater; and the chowder, juice, broth and nectar production increased by 21 percent.

PAPER STOCKPILING PROGRESS

Stockpiling of 12½ million paper cups and containers in the vicinity of nine of the country's largest cities will have been completed by the time this publication appears. The group of cities consists of Detroit, Boston, Philadelphia, Los Angeles, San Francisco, Portland, Seattle and Spokane. Arrangements ar progressing to stockpile a like number of cups and containers adjacent to the following additional cities and pairs of cities: Washington-Baltimore, Birmingham, Atlanta, Houston, New Orleans, St. Louis, Chicago-Milwaukee, Minneapolis-St. Paul. No special stockpile is planned for New York, as a survey of supplies on hand in distributors' warehouses in nearby communities showed that these would be sufficient to meet emergency needs.

When distribution has been accomplished, members of the Paper Cup and Container Institute will have made a total of 25 million paper items available for instant use in case of emergency. Civil defense authorities and Red Cross personnel will have the right to draw on them if needed.

The cups and containers are of various sizes and types to permit serving complete, nourishing meals to large numbers of people under disaster conditions—an undertaking that would be impossible by any other method—and sufficient to last for several days until other supplies could be brought in from outside. In case of attack, they would be ready for use not only in temporary feeding stations set up for refugees, but also in restaurants and institutions whose dishwashing facilities could not be used because of power failures or damage to water supplies. Large quantities also would be needed for dispensing medications.

The program of stockpiling the products of its member companies near the products of its member companies near the areas most likely to become targets in case of attack was adopted by the Institute because it felt that this method would more effectively assure an adequate supply in the right place at the right time than if other organizations were to attempt individually to build up stocks. The latter method, the Institute believes, might scatter supplies about at random in small quantities, making them difficult of access. It might also be that questions of ownership could limit the right of authorities to draw on them in case of need. Furthermore, stockpiling in a planned, orderly fashion by the Institute has assured that there would be no sudden competitive rush into the open market by civil defense agencies and others to buy vast quantities of the paper cups and containers for stockpiling, which might disrupt the steady flow of supplies of these materials for other essential uses, such as in the armed services and in industrial feeding. [Health Officers *News Digest*, 16 (8) 13 (1951).]

NEW PROCESSED FISHERY PRODUCTS

Following the trend in modern food marketing, several new fishery products have been introduced to the public within recent months. Many of these new products are creating markets for previously unused or less acceptable species of fish and shellfish.

Frozen abalone patties utilize that part of the abalone which cannot be marketed in steak form. The meat from thin steaks and trimmings are ground and compressed into 24" x 3" metal cylinders and frozen. The frozen abalone meat is then removed from the cylinders and is cut in ¼" slices, breaded, and packaged—four slices per package. The sliced abalone can then be fried like hamburger patties.

Meat removed from freshly-caught chicken lobsters serves as the basic ingredient in a filling used for the new frozen stuffed lobsters or frozen lobster thermidor. The lobster filling is replaced in the lobster shell for freezing, packaging and subsequent distribution. A quick oven heating prepares this product for the dinner table.

A firm in Canada is now producing salmon and rice croquettes. Chum salmon, not generally popular among consumers when other types of salmon are available, is prepared for croquettes by first mechanically removing the bone and skin. The meat is then mixed with cooked rice, spices, and corn to obtain the proper consistency. This mixture is shaped mechanically into uniform croquettes, fried, and packed six to each 10-oz. tall can. Only three minutes of heating are required prior to service. [From *Com. Fisheries Review*, 13 (7) 30 (1951).]

EMPLOYMENT NOTICES

WANTED: Pickle Maker and Processor, experience essential, tech. background helpful. Location Western Canada. Applicants state age, experience and salary desired. REPLY BOX 168, Institute of Food Technologists, 176 W. Adams St., Chicago 3, Ill.

WANTED: Food Technologist with plant experience, preferably in citrus processing, for applied research position with long established Calif. firm. Strong background in biochemistry and microbiology desirable. Age 30-40. Please send resume including age, education, experience and salary desired. REPLY BOX 170, Institute of Food Technologists, 176 W. Adams St., Chicago 3, Ill.

WANTED: Food Technologist, recent graduate for development laboratory of bakers' and soda fountain supply manufacturer. Experience not necessary. Send complete resumé. REPLY BOX 171, Institute of Food Technologists, 176 W. Adams St., Chicago 3, Ill.

POSITION WANTED: Food Technologist, B.S. and M.S. academics. Experienced in dairy field and quality control. Wishes change to New England area. REPLY BOX 169, Institute of Food Technologists, 176 W. Adams St., Chicago 3, Ill.

AVAILABLE: Food Technologist, age 31, married, 3 yrs. experience in charge quality control lab. B.A. in chemistry and bacteriology, B.S.A. in honors food technology. REPLY BOX 172, Institute of Food Technologists, 176 W. Adams St., Chicago 3, Illinois.

AVAILABLE: Food production man, 9 yrs. experience in Maraschino cherries, preserves, juices, canned Chinese foods and chicken products, frozen eviscerated poultry, fruit and chicken pies. Quality control and product development. REPLY BOX 173, Institute of Food Technologists, 176 W. Adams St., Chicago 3, Illinois.

WANTED: Food-Dairy Technologists with sound college training and commercial exp. in food processing sought by large national organization for openings in Middlewest. Background, aptitude and performance may lead to lab., quality control, prod. supervision, and/or research and development. Please submit comprehensive personal abstract covering exp. and tech. training as well as recent photograph. REPLY BOX 167, Institute of Food Technologists, 176 W. Adams St., Chicago 3, Ill.

AVAILABLE: Food Engineer with 2½ yrs. experience. Age 28, single, M.S. chemical engineering and biochemistry. Desires production or processing. Available immediately. REPLY BOX 174, Institute of Food Technologists, 176 W. Adams St., Chicago 3, Ill.

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BOOKLET ON BIOLOGICAL WARFARE PUBLISHED FOR CIVILIANS

The Federal Civil Defense Administration recently published a 32-page bulletin on biological warfare for the information of civilians and organizations of all kinds. The booklet defines biological warfare, describes the dangers from it, the agents possibly used, and emphasizes the precautions and preventative measures which can be taken as well as the recommended line of action if such attacks would ever materialize. It emphasizes that effective measures can be only taken with the cooperation of every citizen backing up the organized health services.

The booklet entitled "What you should know about biological warfare" (PA-2) may be purchased from the U. S. Government Printing Office, Washington 25, D. C. at 10 cents each with a 25% discount on orders in excess of 100.

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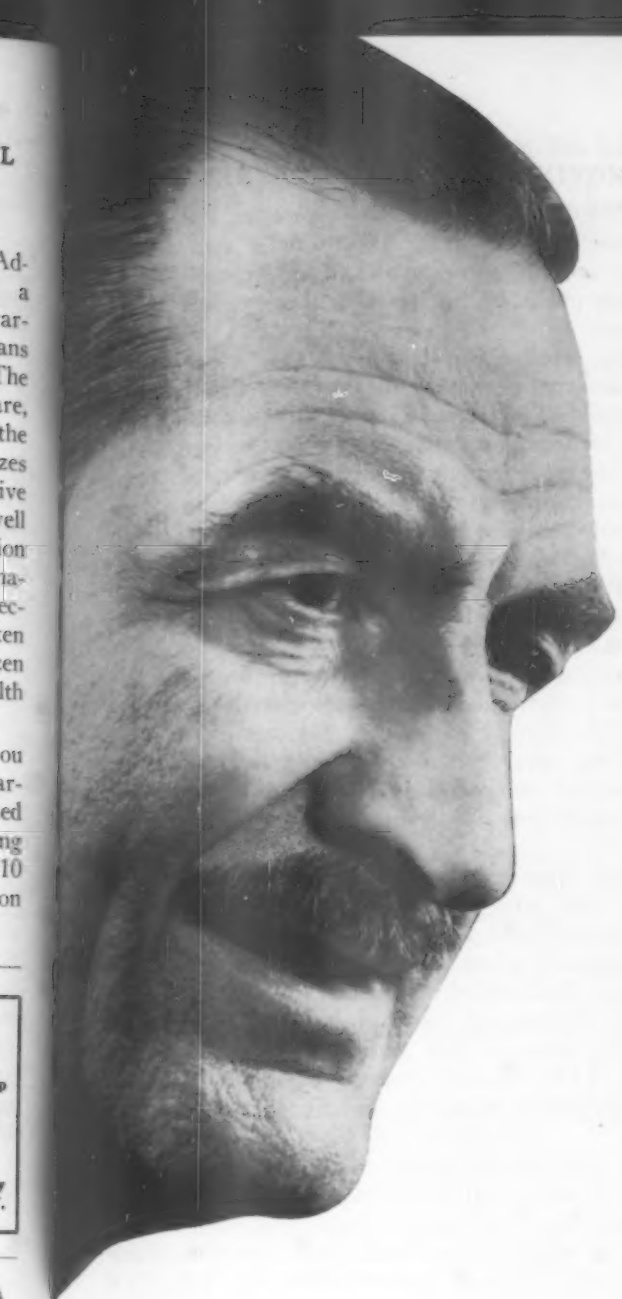

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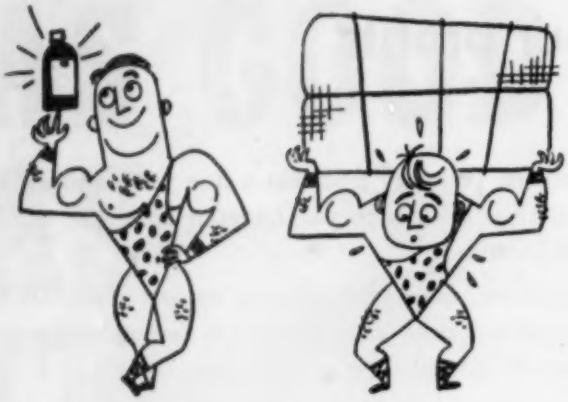

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BUREAU OF MINES RESTUDIES DATA ON MOVING COAL VIA PIPELINE

About $10,000,000 would build a pipeline 100 miles long capable of transporting 5,000 tons of coal a day with water, according to estimates in a Bureau of Mines report made public by Secretary of the Interior Oscar L. Chapman.

After the pipeline was completed and in operation, the estimated cost of moving the coal over the 100-mile journey would be between $1.28 and $1.91 a ton.

Similar construction and operation cost estimates are given for the same length pipeline moving larger tonnages of coal, ranging up to 36,000 tons a day. The construction costs rise for the larger capacity pipelines naturally, but transportation costs per ton go down, the report shows. For instance, the estimated cost per ton of moving coal in the 36,000-ton-a-day line is only 38-95 cents.

Transporting coal with water in pipelines has intrigued the industry and coal technologists for over half a century, the Bureau points out. Because of technical "bugs" it has never been adopted on a large scale, although several enterprising concerns have built and operated short lines for transporting certain types of coal.

The first American patents covering a method of pumping coal with water through pipelines were granted in 1895 and 1905. The latest development is announcement by a large coal company of plans to build a full-scale demonstration pipeline in Ohio through which will be pumped finely ground coal mixed with water. The proposed line is to be a 12-inch, 17,000 feet long. This announcement was made after the Bureau completed its survey described in the current report.

"There still remain many pump performance and behavior of water-coal mixture problems that can be solved only by actual performance tests" the Bureau notes in its report. For details see: Interior release 2001. [From *Defense Production Record*, 1, (16) 6 (1951), August 16.]

FUTURE DATES FOR FOOD TECHNOLOGISTS

1952

Jan. 14-17	Plant Maintenance Show and Conferences, Convention Hall, Philadelphia Pa.
Jan. 16-18	Canadian Food Processors Association, Annual Convention, Chateau Frontenac, Quebec, P. Q.
Jan. 17-18	National Pickle Packers Association, Winter Meeting, Roosevelt Hotel, New York, N. Y.
Jan. 19-23	Conventions of the National Canners Association, National Food Brokers Association, and Canning Machinery and Supplies Association, Atlantic City, N. J.
March 3-7	National Association of Frozen Food Packers, Hotel Stevens, Chicago, Ill.
April 20-25	American Association of Cereal Chemists, National Convention, Adolphus Hotel, Dallas, Texas.
June 8-12	**Institute of Food Technologists, Twelfth Annual Meeting, Grand Rapids, Mich.**

(Information concerning future dates of national and international meetings, conventions and exhibits of interest to food technologists should be sent to the editorial office.)

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Authors of papers intended for publication in FOOD TECHNOLOGY should request from the editorial office a copy of the booklet, entitled "Information and suggestions to authors." Manuscripts submitted for publication in FOOD TECHNOLOGY should follow the style described in this booklet.

The Institute of Food Technologists assumes no responsibility for statements in contributed articles appearing in FOOD TECHNOLOGY. Editorials present only opinions of the writers and do not necessarily reflect policies of the Institute of Food Technologists.

News of the Institute

IFT PRESENTS ILLUMINATED SCROLL TO THE AMERICAN CHEMICAL SOCIETY

On September 5, 1951, during the ACS Diamond Jubilee Meetings in New York, President Charles N. Frey presented to the ACS an illuminated scroll with the following text:

> The American Chemical Society has been a potent factor in making possible many of the scientific developments that characterize the modern food industry. The Institute of Food Technologists acknowledges these contributions which have so greatly influenced the life and well-being of the American people.
>
> We felicitate the American Chemical Society on the occasion of its Diamond Jubilee and extend our sincere good wishes to the officers and members of the Society. May the next seventy-five years bring forth even greater accomplishments by the Society.
>
> (Signed) CHARLES N. FREY
> President.

Early in October, President Frey received the following letter from Dr. N. H. Furman, President of the ACS:

DEAR DR. FREY:

> The beautiful illuminated scroll presented by the Institute of Food Technologists to the American Chemical Society on the occasion of our Diamond Jubilee is one of the valued mementoes of this event. The celebration has left happy memories in the minds of thousands. In the years to come re-examination of the scrolls and gracious letters from our sister societies, presented at this time, will bring back these recollections.
>
> The American Chemical Society values the close relations which it has with other scientific and engineering organizations. This is particularly true when the field of activity is so close as that of the Institute. Consequently, I was gratified that the society of which you are president could participate in the celebration of our seventy-fifth birthday. It was particularly pleasing to me that you were the representative.
>
> The work of the Institute of Food Technologists is one from which the people of this country directly benefit. However, we feel that many of your contributions to them are based upon the advances contributed by members of this Society, with which your membership has great overlapping. Consequently, we trust that in the years ahead our two societies may progress together for the benefit of all.
>
> Cordially yours,
>
> (Signed) N. H. FURMAN
> President.

COMMITTEES FOR 1952 NATIONAL IFT MEETING

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Canadian Publicity: T. B. Calder, Chairman.

Regional Section News

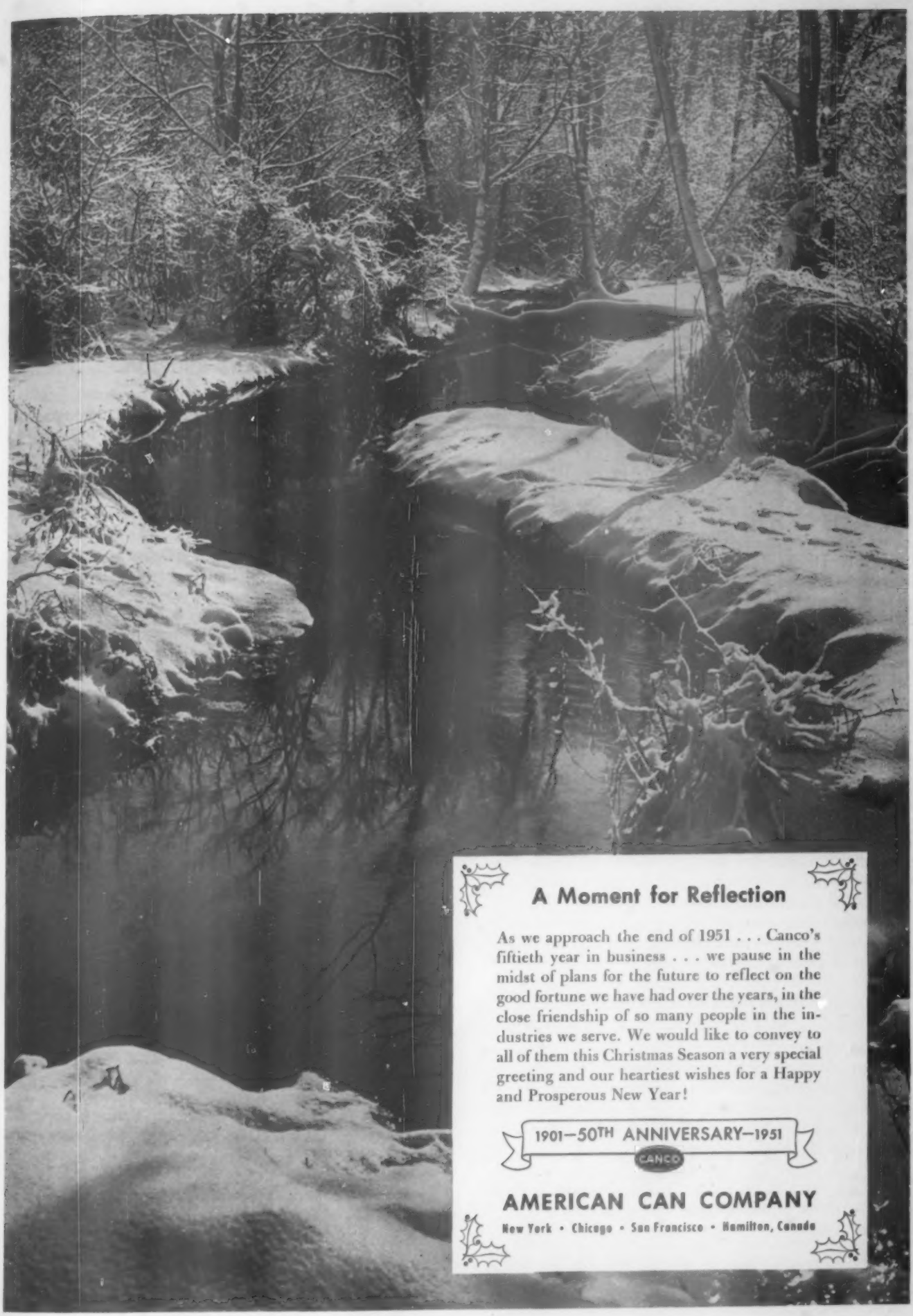
PHILADELPHIA SECTION

The Section held its October meeting on the 10th. Following a dinner at Beck's Restaurant, the members drove to The Institute for Cancer Research, Fox Chase, Philadelphia, not far from the restaurant, to hear Dr. Stanley P. Reimann, Director of The Institute for Cancer Research, address them on the topic of "Metabolism and Cancer." Wives, sweethearts and friends were also invited to attend this meeting since the trip through the Cancer Research Laboratories was considered to be one of the high spots of the Section's Fall Season. Members of the Research Staff were on hand to explain their work to the visiting IFT'rs. Dr. Reimann also lectures at the University of Pennsylvania and at Hahnemann Medical College.

NORTHEAST SECTION

The Section held its November meeting on the 1st at the Hotel Brunswick, Boston, Mass. Speaker for the occasion was Dr. Lucius W. Elder, Director of the Technical Services Area, Central Laboratories, General Foods Corporation. Dr. Elder spoke on "Packaging Research Applied to Food Products" and following his

(Continued on page 6)



A Moment for Reflection

As we approach the end of 1951 . . . Canco's fiftieth year in business . . . we pause in the midst of plans for the future to reflect on the good fortune we have had over the years, in the close friendship of so many people in the industries we serve. We would like to convey to all of them this Christmas Season a very special greeting and our heartiest wishes for a Happy and Prosperous New Year!

1901—50TH ANNIVERSARY—1951

CANCO

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News of the Institute

(Continued from page 4)

talk a round-table discussion of packaging problems was conducted. Members were encouraged to bring up their own packaging problems at this "Packaging Clinic."

NORTHERN CALIFORNIA SECTION

The October meeting, held on the 11th at the Merchandise Mart, San Francisco, saw members enjoy a buffet supper and later hear a discussion on "Highlights of National Canners Association Research" by Dr. E. J. Cameron, Dr. J. Russell Esty, and Dr. E. D. Clark, all with the NCA. Dr. Cameron is director of the NCA Research Laboratory at Washington, Dr. Esty is director of the NCA Western Branch Laboratory at Berkeley, California, and Dr. Clark has, since 1921, served as secretary of the Northwest Branch of the National Canners Association.

PUGET SOUND SECTION

The opening meeting of the Puget Sound Section was held in the Mirror Room of the New Washington Hotel, Seattle, Washington, the evening of September 19, 1951. Dr. D. G. Sorber of the Western Regional Research Laboratory, USDA., of Albany, California, gave a most interesting and informative talk on the "History of the Frozen Food Industry in the Northwest." Dr. Sorber has been identified with the frozen pack industry for the past thirty years and results of his research have been an important factor in the development of that important industry. His talk was highlighted by the recitation of many historical incidents not too generally well known. The interesting historical review was well received and provoked considerable discussion and the presentation of numerous questions.

The meeting was called to order by our newly elected chairman, T. L. Swenson of the Food, Chemical and Research Laboratories, Inc., of Seattle, who was proud to present the newly elected officers and working committees for the ensuing year.

An interesting schedule of meetings is planned by the program committee and the Puget Sound Section is assured of another successful year of accomplishments.

GREAT LAKES SECTION

This Section held its Fall Meeting on October 19 at the St. Clair Inn, St. Clair, Michigan. The morning was devoted to conducting groups through the Diamond Crystal Salt plant with W. J. Mahan, technical director of Diamond-Colonial Salt, handling the arrangements. The afternoon program at the St. Clair Inn consisted of the presentation of three papers:

"Chemistry and industry of starch and dextrines" by G. V. Caesar, Director of Research and Developments in Starch, The Huron Milling Co., Harbor Beach, Mich.

"Corn sweeteners; their manufacture and food uses" by George T. Peckham, Jr., Research Director, Clinton Foods Inc., Clinton, Iowa.

"Starch properties important in some food uses" by H. A. Campbell, Technical Director, Scientific Development Area, General Foods Corporation, Research and Development Dept., Hoboken, New Jersey.

Mr. Caesar in his paper presented an outline of the present status of the chemistry of starch and its commercial derivatives together with information covering their manufacture and use. Mr. Peckham's talk described in a general way the wet milling of corn for the recovery of corn starch and the conversion of starch to corn syrups and sugars. He also discussed the various classes of corn sweeteners and the general principles of their uses in foods.

The after-dinner speaker in the evening was Thomas A. Ryan of the law firm of Ryan, Tincher and Brideau, Cleveland. He spoke on "Food-Indoctrination."

MARYLAND SECTION

Although absent from these pages for some months, the Maryland Section has had an active and interesting year. In January, Dr. Roy Magruder of the USDA spoke on "The Effect of The Research and Marketing Act on Food Technology," while in February Mr. Frank LaQue of International Nickel spoke to us on "The Selection of Materials for Food Processing Equipment." March brought us Dr. H. Price-Davies, Scientific Officer of the British Embassy, whose topic was "Food Research in Great Britain," while Dr. Jean Caul of Arthur D. Little spoke on "Sugar as a Seasoner," in April.

In May we were honored to have President-Elect of the IFT, Dr. Charles N. Frey, who discussed "The Newer Responsibilities Faced by the Food Manufacturer." The meeting in June was held in the new building of the National Canners Association in Washington, and Dr. E. M. Kenyon of the Quartermaster General's office talked on "Army Ration Research."

The September meeting was held at Gunther's Brewery in Baltimore, and featured a plant tour and a talk by Dr. William Siebenberg, Chief Chemist. The October meeting was held at the USDA's Agricultural Research Center at Beltsville, Maryland and afforded the members a chance to view some of this huge installation.

PERSONNEL

WILLIAM DE BACK, Vice-President, Director, and Manager of the Anderson-Barngrover Division of the Food Machinery Corporation of San Jose, California, has been transferred to the Corporate Office to become a member of the Corporate Executive Staff.

I. J. HUCHINGS, Head of Packaging and Sterilizing Laboratory of the H. J. Heinz Co. of Pittsburgh, Pa., has been appointed Manager of Food Research. Dr. Huchings is a graduate of Brigham Young University and obtained his Ph.D. at Rutgers. He has been with Heinz since 1947.

VALENTINE VAN DUZER has been appointed Manager of the new Oakland, California plant of the Wm. J. Stange Co., of Chicago, Ill.

RAYMOND E. WILLIAMS, a staff member of Dodge and Olcott, Inc. of New York, N. Y. for the past eleven years, has been appointed Manager of the company's Foreign Sales Department.

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ENERGY AND PROTEIN CONTENT OF NATIONAL AVERAGE FOOD SUPPLIES IN 1950-51

The preliminary estimates together with other information available indicate slight gains during 1950-51 in average calorie levels and to a smaller extent in protein supplies in most regions, especially in North America, Europe, and Latin America. This represents a continuation of the slow upward trend that has been noticeable in the past few years. Nevertheless, except perhaps in Western Europe, there is little to suggest any fundamental change in the pattern of consumption that has emerged in postwar years. It still remains broadly true that, in the majority of the worst fed countries, comprising a major part of the world's population, food supplies are lower both in quantity and quality than they were before the war, while many of the countries that have improved their food situation were already among the most adequately fed nations before the war. For example, nutritional levels are still unsatisfactory and have not yet returned to the low prewar levels in large parts of Africa and of the Near and Far East. In some countries like India there has even been a recent deterioration which, although caused mainly by crop failures, once again emphasizes the long-term problem of assuring the country's food supply. Even in Latin America, where the food consumption of a rapidly rising population is now better than ever before, average levels in many of the countries are barely sufficient and in a few of them quite inadequate. Moreover, the improvement in Latin America has been effected to an increasing extent by reducing some of the region's exports of valuable foodstuffs, such as meat and cereals, to other parts of the world.

A disturbing feature of the postwar pattern of consumption is the still greater disparities that now exist between well and poorly fed countries in the consumption of animal protein, as compared with the position before the war. For example, both in the United States and Canada, per caput supplies of animal protein are now 20 percent above the relatively high prewar levels, but in many countries in the Far East, Near East, and Africa, supplies of animal protein scarcely exceed or have even failed to reach the very low levels that prevailed before the war. Nor has any significant progress been recorded in the past few years. It is of course desirable that priority be given to staple energy food crops like cereals, starchy roots, and vegetable fats in regions where the total calorie intake is far from adequate. Nevertheless, the more difficult problem of increasing livestock production at a pace faster than that of the human population must be vigorously confronted if the much needed improvement in the quality as well as quantity of the diet in these regions is to be achieved. Even in Europe, the task of restoring livestock production and per caput supplies of animal protein to around prewar levels has been a long and arduous one. Nor has it yet been fully accomplished in some of the countries in Central, Eastern, and Southern Europe. Progress in the last two years has been more rapid than in the past. In particular the unprecedentedly high levels of flour and milk consumption in a number of European countries is an encouraging feature. But much of this progress is of a precarious nature depending on a feed supply that is barely adequate. Indeed the trend is already showing signs of slowing down and may easily be reversed if the rate of agricultural progress is seriously impaired by developments in other fields. [From *FAO Food and Agr. Statistics*, 4 (9) 28 (1951) September.]

AGRICULTURAL SCIENCE SERVICE LABORATORY OPENED AT LONDON, ONTARIO, CANADA

The new Agricultural Science Service Laboratory of the Science Service has been completed at London, Ont. The Laboratory will be specifically concerned with the ecological effects of agricultural chemicals (other than fertilizers), with the coordination of departmental research on the application of chemistry to entomology and plant pathology, and with post-graduate training in these subjects.

The building is completely air-conditioned, and is divided into six separate controlled zones. The basement has two sections. One of these contains fumigation research equipment, and the other breeding rooms for insects or animals and controlled temperature rooms.

Administrative offices are centralized on the first floor. In addition to the seminar room and a photographic laboratory on the second floor, the building consists of nine laboratories. Each of these is constructed as a unit plant and consists of a central laboratory with offices and utility rooms at end.

The Laboratory at present has a staff of some 17 scientists working in the Bacteriology, Botany and Plant Pathology, Chemistry, Entomology, and Fumigation Sections. Dr. H. Martin is Director of the new London Laboratory.

AGING OF PLASTICS IN OUTDOOR WEATHER REPORTED BY ASTM

The effects of outdoor weather aging on various types of plastic materials were investigated by the United States Navy and reported in the paper "Outdoor Weather Aging of Plastics Under Various Climatological Conditions" which appears in the April 1951 issue of the *A.S.T.M. Bulletin*, pages 31-43.

The report covers exposures for 1, 3, 7, and 12 months, in five widely different climates, of five types of clear transparent sheet plastics, six types of laminated materials, and five types of molded terminal bars. The sheet materials are evaluated after each period of exposure for tensile and flexural properties, hardness, and dielectric constant and power factor.

The electrical properties are given for frequencies of 60, 1000 and 10^6 cycles. The transparent materials are evaluated also for light transmission and haze. The molded terminal bars are evaluated for insulation resistance, dielectric strength, and high impact shock resistance. [From *Aminco Lab. News*, 8 (5) 10 (1951) September.]

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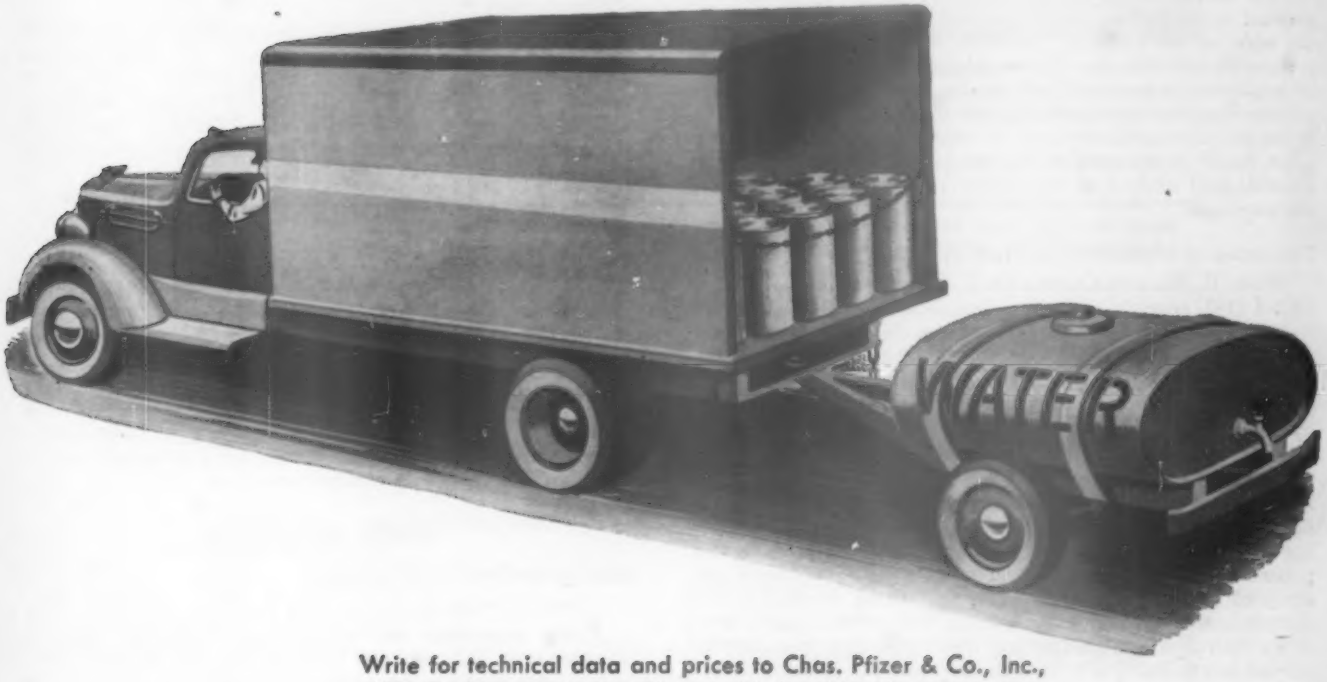

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Selected Abstracts[a]

BIOLOGICAL SCIENCES

BIOCHEMISTRY

Observations on a relationship between vitamin B_{12}, folic acid and the citrovorum factor.

DIETRICH, L. S., MONSON, W. J., AND ELVEHJEM, C. A. *Proc. Soc. Exptl. Biol. Med., 77,* 93-6 (1951).

Vitamin B_{12} injected at low levels increased the PGA stored in chick liver tissue. Higher levels of injected vitamin B_{12} suppressed the liver storage of PGA. Vitamin B_{12} administered orally, increased the level of both PGA and LCF as measured by chick liver storage. Vitamin B_{12} injected at the level of 1 γ per day significantly inhibited the conversion of PGA to LCF in PGA-vitamin B_{12} deficient chicks. This inhibition was overcome by the *in vitro* addn. of ascorbic acid. The oral administration of vitamin B_{12} at the level of 1 γ per day significantly increased the conversion of PGA to LCF with or in the absence of ascorbic acid, in the PGA-vitamin B_{12} deficient chick. The possible relationships and interactions of vitamin B_{12}, PGA, LCF, and ascorbic acid have been discussed.

On the nature of ascorbic acid oxidase.

DUNN, F. J., AND DAWSON, C. R. *J. Biol. Chem.,* 189-97, 485-97 (1951).

The results of this investigation support the view that ascorbic acid oxidase from the summer crookneck squash (Curcurbita pepo condensa) is a specific copper protein, blue-green in color, having a mol. wt. in the neighborhood of 150,000 and contg. 6 copper atoms per mol. A homogeneous prepn., judging by electophoretic and ultracentrifugation criteria, has been prepd. for the first time. The blue-green color of the enzyme is dependent on the presence of oxygen and is reversibly bleached by the addn. of the substrate, l-ascorbic acid. The results are not compatible with the view that ascorbic acid oxidase actitvity can be explained in terms of ionic copper adsorbed to non-specific protein matter or other colloidal material such as calcium phosphate gel. No significant amts. of either calcium or phosphorus were found in the purified enzyme. It is also clear that the ascorbic acid oxidase of the yellow crookneck squash is not a nucleoprotein.

The action of crystalline β-amylase on corn crystalline amylose.

KERR, R. W., AND CLEVELAND, F. C. *J. Am. Chem. Soc., 73,* 2421-4 (1951).

The object of this investigation was to study the action of a crystalline β-amylase on a highly purified amylose in order to decide which of two possible mechanisms proposed, "single-chain" or "multiple-chain" action is the more probable one. The hydrolysis was interrupted at approx. the mid-point. The high polymer fraction of the hydrolysate was sepd. by alc. fractionation and crystd. as platelets from aq. butanol. Osmotic pressure measurements, ferricyanide oxidation and intrinsic viscosity detns. showed it to be the same as the original amylose in average chain length and in chain length distribution. The low polymer fraction, estd. as maltose by ferricyanide oxidation, was analyzed by paper chromatography and found to consist only of maltose with possibly trace amts. of maltotriose. Quant. detn. of the hydrolysate as maltose and residual amylose mols. having a chain length identical to the original substrate, strongly favors the theory that β-amylase operates by a "single-chain" mechanism. These results disprove the theory that at any ratio of enzyme to substrate, all linear chains are attacked simultaneously.

Purification of horse-radish peroxidase and comparison of its properties with those of catalase and methaemoglobin.

KEILIN, D., AND HARTREE, E. F. *Biochem. J., 49,* 88-104 (1951).

A simple method is described for the isolation and purification of peroxidase from horse-radish roots. The prepn. contd. 13.2% nitrogen and 1.61% haemin. The mean value of its activity in terms of Purpurogallin Number was 1220 and the mol. wt. was about 40,000. Absorption curves in the visible and Soret regions are given for peroxidase, for its alk. and reduced forms, and for its compds. with carbon monoxide, cyanide, azide, fluoride and hydrogen peroxide. The absorption bands in the visible region give a better indication than those in the Soret region of changes in the Fe linkages of peroxidase and its derivs. These bands may be observed in crude enzyme prepns. and even in slices of horse-radish root. No evidence was found that 'paraperoxidase' exists as such in horse-radish roots, but it could be obtained as a transformation product of pure peroxidase. Peroxidase catalyses the oxidation of dihydroxymaleic acid directly without the need for quinol or any other 'carrier'.

Toxic factor from agenized proteins: infra-red measurements.

SHORT, L. N., AND THOMPSON, H. W. *J. Chem. Soc.,* 1746-9 (1951).

Infra-red spectra of the toxic factor from agenized proteins previously examd. by other workers, and of compds. of related chem. structure, have been measured. The results confirm the suggestion that the toxic agent is the sulphoximine from L-methionine.

NUTRITION

Excessive citrus juice consumption. Clinical observations of its effect on superficial and deep tissues of the oral cavity.

HICKS, H. J. *Am. Dental Assoc., 41,* 38-44 (1950); *Nutrition Abstracts and Reviews, 20,* 713, No. 4071 (1951).

Histories are given of 7 people who regularly drank large quantities of citrus fruit juices and who were suffering from systemic effects as well as local effects on the oral cavity. All responded to decreases in citrus fruit juice intake. Emphasizes that an excessive consumption of citrus juices is harmful and that a large part of the vitamin C intake should be obtained from other sources.

ENGINEERING

Vacuum cleaning in a modern flour mill.

BONHAM, H. H. *Am. Miller, 79,* 24-6, June, 1951.

Vacuum cleaning process cuts dust hazard, cleaning costs, and attacks insect infestation at the source.

Grinding with liquid N_2.

Chem. Eng., 58, 106-07, June, 1951.

Possible applications of freeze treatment of very hard or heat-sensitive material to facilitate grinding or reduce losses of volatile fractions during grinding are given.

FOOD PRODUCTS

Milk preservation with radiation.

Atomic Energy N. L., 5, 3, July 3, 1951.

Using large doses of radioactivity, a Columbia University research team has succeeded in preserving milk up to periods of at least one month under ordinary refrigeration. The research group, utilized a 2 m.e.v. X-ray machine in this work. Samples of raw milk were treated with as much as 100,000 R. It was found that the vitamin content was unimpaired at these radiation levels, and that no residual radioactivity could be detected in samples receiving up to 1,000,000 R. The samples were then stored under different conditions, and their storage life was compared with that of raw milk and pasteurized milk.

The precipitation of whey proteins using waste sulphite liquor.

HARE, J. H., AND BAKER, B. E. *Can. J. Technol., 29,* 332-6 (1951).

(Continued on page 16)

[a] These Selected Abstracts are made available to FOOD TECHNOLOGY through the cooperation of Associate Editor Aksel G. Olsen and the General Foods Corporation of New York, N. Y. The abbreviations found in these abstracts are similar to those used by Chemical Abstracts.

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Proteolytic	RHOZYME P-11	Commercial	Hydrolyze proteins to peptides and amino acids. pH ranges 5.5 - 8.5 (Relative amounts of peptides and amino acids will differ for each proteolytic enzyme.)
	Protease 15	Experimental	
	Protease 16	Experimental	
Amylolytic	RHOZYME S	Commercial	Hydrolysis of starch to dextrins, maltose and glucose. Contain both an alpha amylase and a strong glucogenic principle. pH range 5-6. RHOZYME S is a purified enzyme; RHOZYME T-22 the crude product.
	RHOZYME T-22	Commercial	
	RHOZYME DX	Commercial	Hydrolysis of starch to dextrins. Heat stable. pH range 5.5-6.5.
Lactase	Lactase B	Experimental	Hydrolysis of lactose to glucose and galactose. pH range 6.1-7.5.

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EUROPE MAKING PROGRESS ON FOOD PACKAGING

Progress being made toward better quality and packaging of food products will help Western Europe feed itself more adequately as well as earn foreign currency to maintain trade, according to a California canning executive-consultant to the Economic Cooperation Administration and as reported in a May 24, 1951, news release from that agency. These improvements would also make it easier to feed allied forces in Europe if there should be any interference with shipping.

Reporting on a three-month trip covering most Marshall Plan countries, the consultant attributed recent progress in food processing and handling to three factors: (1) The forward-looking attitude of certain food industries in various European countries, (2) the influence of American forces in Europe during and following the war, and (3) technical help furnished by ECA through its missions and technical assistance projects.

Progress in quick-freezing, canning, and other processing methods, is helping the Marshall Plan countries extend the market and season for food supplies. It also is cutting food losses, and resulting in food with more vitamins. As a result, the Western European countries will be better able to feed their growing population, as well as improve living standards.

From conference with many branches of food and related industries, the consultant reported numerous examples of enterprise by European concerns to put up better quality products.

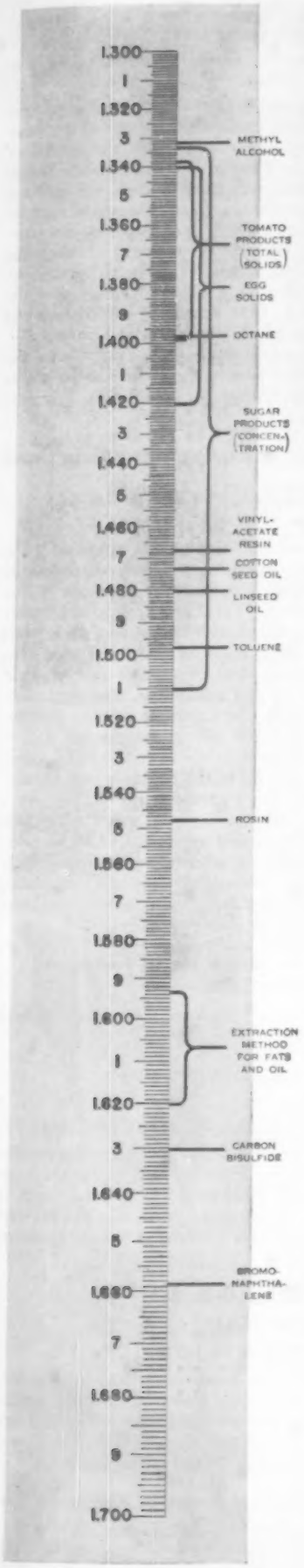
The Marshall Plan countries generally, the food consultant reported, are taking an increasing interest in food standardization. Sweden is expecting a new food and drug law; Turkey is making good headway toward standardization, with similar progress noted in other countries.

In Norway and Sweden outstanding examples of steps to maintain quality of export goods were found. Both countries have excellent laboratories to inspect products to see that minimum quality standards are met as a requisite for export licenses. [From *Com. Fisheries Rev.*, **13** (6) 50 (1951).]

U. S. CONSUMPTION OF TIN

According to National Production Authority figures, the U. S. tin consumption in 1950 was the highest since 1941. The U. S. consumption of primary and secondary tin during the past two years (in long tons) was as follows:

	1949	1950
Tin and terne plate	31,049	38,179
Bronze	13,746	19,858
Solder	15,297	27,415
Babbitt	4,530	6,142
Tinning	2,388	3,986
Collapsible tubes	736	1,144
Foil	199	409
Type metal	1,170	1,499
Chemicals	383	817
Tin oxide	485	890
Sheet, pipe, and tube	249	468
Brittania metal	151	1,013
Other and unclassified	987	1,792
Total	71,370	103,612



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Abstracts

(Continued from page 12)

Waste sulphite liquor has been used for recovering whey proteins. The protein pptg. action of sodium lignosulphonate has been compared with that of various other sulphonates. Attempts to isolate the whey proteins from the lignosulphonate complex have been unsuccessful. Preliminary rat-feeding tests indicated that the lignin-protein complex could be well tolerated when it supplied 10% of crude protein in the diet.

Quality determinations on fresh-water fish and the influence of their feeding on the quality.

SANDER, G. *Fischereiwelt, 2,* No. 10, 159, Oct., 1950; *World Fish. Abstracts, 2,* 23, Mar.-Apr., 1951.

A no. of chem., bacteriol., and histological tests have been studied to ascertain the quality of the flesh of fresh-water fish. Bacteriol. methods, detns. of trimethylamine, skatole, indole, and toxic substances, and phys. tests were found too complicated or time-consuming to serve as routine tests. A colorimetric test for the formation of hydrogen sulfide was found more satisfactory. This consists of dry heating 1 kg. back muscles for 5 minutes at 250° C. (482° F.). The amt. of hydrogen sulfide thus extd. begins to increase continuously, long before the stored fish shows any external signs of change or spoilage.

Oxidation in apple juice. I. Preliminary, investigation of the relationship between the dissolved oxygen content and oxidation of apple juice during processing and shelf-life in bottle.

MARSHALL, C. R. *J. Sci. Food Agric., 2,* 314-21 (1951).

Methods of estg. dissolved oxygen in beer and for measuring the reducing activity of beer have been applied to the study of oxidation in apple juice during processing and throughout its shelf-life in bottle. Freshly pressed juice is highly oxidized but becomes less so after clarification and filtration. Juices differ in their ability to absorb additional oxygen during processing and there is a protracted time-lag between absorption and increase in oxidation. In general, after bottling, oxidation increases unless the juice is pre-heated before the bottles are sealed. After long storage in bottle, apple juice becomes strongly reducing, dissolved oxygen diminishes and a sediment is thrown. Hazes and deposits develop less rapidly in pasteurized juices than in those bottled by sterile filtration and are generally less intense if either air-space in the bottle or excess oxygen in the juice is reduced.

Oxidation in apple juice. II. Some observations on deaeration.

MARSHALL, C. R. *J. Sci. Food Agric., 2,* 321 (1951).

Removal of dissolved oxygen from apple juice in a lab. deaeration-app. has been studied. The efficiency of the deaerator for removing dissolved oxygen from cold water was found to vary with the initial oxygen content and history of the sample and did not exceed 76%. The efficiency was raised to well over 80% by multiple-stage deaeration, and to over 96% by single-stage deaeration at temps. of 120° or over. Oxygen removed from apple juice in the same app. was poor. Three-stage deaeration at temps. of 180° F. was required to attain 89% efficiency on fresh juice, whereas tank-stored juice under similar conditions lost less than 40% of its oxygen. Oxygen dissolved in apple juice is believed to exist in both "free" and "bound" states, the proportion of "bound," to "free" increasing with length of storage. Only the "free" oxygen is removed completely by deaeration.

Oxidative stability of orange oil.

KESTERSON, J. W., AND HENDRICKSON, R. *Am. Perfumer Essent. Oil Rev., 57,* 441-4 (1951).

An improved Warburg technic for measuring oxygen consumption of orange oils is described. It is claimed that time required for 1 g. oil to absorb 1200 microliters oxygen is a measure of stability. Stability (as detd. by the Warburg method) is related to quantity of oil extd. from peel. Other things being equal, no stability differences between Florida and California oils were found.

Formation of ice in tissues in freezing foods.

BERGH, F. *Ingeniorvidenskab. Skrifter 3,* 1948. *Food Sci. Abstracts, 22,* 362, No. 1591 (1951).

A review of the methods and results of previous investigations is given. A special freezing chamber, designed for the stage of a microscope, to reproduce as far as possible the conditions brought about by freezing in a radial section through frozen foods is described. This technic was used to study the freezing of muscle tissue, especially the diaphragm and abdominal muscles of the mouse, and the freezing of the flesh of tomatoes and beet-roots. The formation of ice takes place primarily through the coherent masses of water in the tissues. Only where quantities of liquid are sepd. from the coherent liquid-filled spaces, as in the cells, is supercooling observed. It is concluded that the size of the ice-filled spaces found in frozen tissues, which varies with the rate of freezing, depends solely on the time available for the diffusion of water from the unfrozen to the frozen zones, and is not related to the formation of a larger or smaller no. of crystal seeds.

Propyl gallate - ethyl gallate, outstanding antioxidants, unique stabilizers.

Goldschmidt Chemical Corporation, 1950; *World Fish. Abstracts, 2,* 45-6 (1951).

A review of the properties and uses of the esters of gallic acid as antioxidants. Propyl gallate is nontoxic as ordinarily used. (The U. S. Department of Agriculture approves its use in edible fats in 0.01% concn.). Very low concns. are highly efficient in stabilizing the flavor and odor of the original product without any known adverse effect upon its flavor and odor. The effectiveness is enhanced by the addn. of a small amt. of citric, tartaric, or phosphoric acid. Propyl gallate has been used effectively in mayonnaise, dried milk for chocolate manuf., shortenings, butter, lard, edible vegetable oils in concns. of 0.01 to 0.05%. The addn. of 0.05% propyl galate to cod liver oil stored up to 40 days inhibited the increase in the peroxide no. considerably; there was practically no increase with 0.2%. As a stabilizer of vitamin A in fish oil, e.g., in shark oil, 0.04% isobutyl gallate and 0.02% citric acid are indicated to be effective for at least 10 months. Dipping salmon and herring fillets in a 0.5% propyl gallate soln. for 1 minute, similar to incorporating 0.05% of the antioxidant into the flesh, had good antioxidative effects when the fish were held at —20° C.

Why two new insecticides are safe to use on food crops.

Food Packer, 32, 42, June, 1951.

Methoxychlor and EPN show high insect kill: residues break down during canning.

PACKAGING

Precipitation coating.

ERICKSON, D. R. *Modern Packaging, 24,* 107-09 (1951).

A new method is described for depositing a continuous film on the surface of paper stock. Hydroxyethyl cellulose is deposited on the paper surface, following which a salt soln. is applied. Pptn. of the HEC occurs in the form of a flexible protective film. High greaseproofness is claimed for the resultant sheet.

PATENTS (U. S. A.)

Composition for the baking of bread.

HANSEN, F. F. 2,557,283, June 19, 1951.

A prepn. for incorporation in bread dough comprising hard fat particles of a mesh size of 200 and finer and having a melting point of 130° to 160° F., the particles being coated with a dry, fluffy, powder comprised of calcium acid lactate mixed with lesser volumes each of calcium sulfate and corn starch.

Bakery shortening composition and method of making the same.

WADE, R. W. 2,557,524, June 19, 1951.

A shortening substitute comprising a mixt. of approx. 115 parts by wt. of water, approx. 8 parts by wt. of corn starch,

(Continued on page 24 following technical papers)

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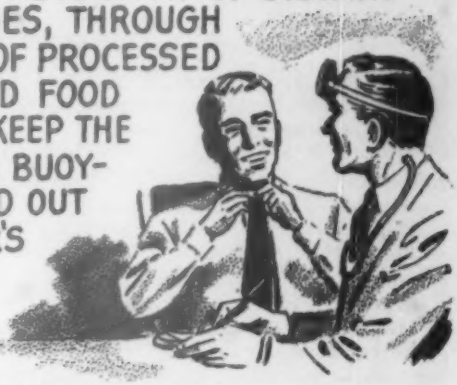

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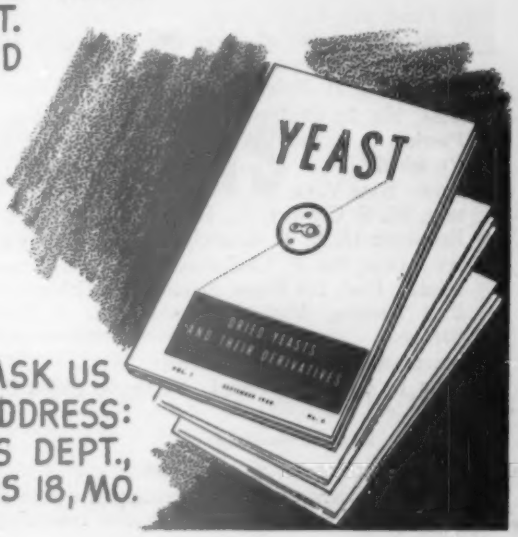

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Abstracts

(Continued from page 16 preceding technical papers)

approx. 8 parts by wt. of glucose, approx. 16 parts by wt. of corn oil, approx. 5.3 parts by wt. of propylene glycol, and an edible pH controlling agent in an amt. such as to impart to mixt. a pH in the range from 5 to 7, which mixt. has been heated to a temp. of approx. 202° F. and then cooled to a temp. of approx. 80° F.

Baking apparatus.

SARCHET, T. H. 2,559,801, July 10, 1951.

Baking app. comprising a base, supports mounted on base, a pair of shafts rotatably mounted on supports, a baking grid mounted on each of shafts and rotatable therewith, grids being rotatable toward each other into baking positions and away from each other into non-baking positions, a bar having one of its ends fixedly secured to one of shafts for rotation therewith, a lever bar having one of its ends pivotally supported above base and engageable intermediate its ends with the other end of bar when the shaft carrying the latter bar has been rotated in a direction to cause movement of its baking grid toward and into the baking position, and means engaging the other end of lever bar for effecting the movement of lever bar out of engagement with bar whereby one grid is moved into its non-baking position.

Baker's grease.

TRUESDELL, R. S. Assignor to Don Parsons and Wayne Hanson. 2,559,481, July 3, 1951.

The method of producing a baker's grease consisting in heating a potable oil to a temp. of at least 150° F., adding lecithin to the heated oil, then adding melted beeswax to the heated oil and lecithin mixt. under agitation and homogenizing the mixt.

Cacao process and product.

KEMPF, N. W., AND MURER, H. K. Assignors to General Foods Corp. 2,558,854, July 3, 1951.

A process for the non-fermentative curing of raw cacao which comprises maintaining the cacao at a temp. between 50° C. and 65° C. and with a moisture content not less than 12-15% for a period between 5 and 50 hrs., and then arresting the curing by rapidly drying the resulting product.

Manufacture of chocolate.

EDWARDS, G. W. 2,558,128, June 26, 1951.

A method for treating chocolate paste, for the purpose of being substituted at least partially, for the conching operation, comprising centrifugally spreading the paste in a thin exposed layer, atomizing paste, and spreading it again in a thin layer.

Process for manufacture of candy coated apples or the like.

CANFIELD, J. A. 2,558,234, June 26, 1951.

The process of mfg. candy coated apples and like products, comprising prepn. of a base formula by stirring and cooking a mixt. comprising approx. equal units by wt. of commercial glucose and granulated sugar, about one-third unit of hard fat, a wetting, a dairy product enrichener and salt, heating such mixt. to a temp. somewhat above boiling to insure removal of most water, allowing the mixt. to cool to a substantially lower temp., then mixing in about one-half unit of a heavy fondant, and finally dipping the apples in the cooled resultant mixt. maintained at a temp. not greatly above that at which the same fairly sets.

Stabilization of edible fats and oils.

CHENICEK, J. A., AND GLEIM, W. K. T. Assignors to Universal Oil Products Company. 2,557,921, June 26, 1951.

A method of stabilizing edible fats and oils against rancidity which comprises adding thereto a hexahydroxy-p-terphenyl having two hydroxy radicals on each of the phenyl rings.

Process of removing mineral oil from vegetable fibers.

OLIVER, R. R. Assignor to Lockport Cotton Batting Co. 2,557,993, June 26, 1951.

A process of removing mineral oil from vegetable fibers contaminated therewith which includes the steps of subjecting the fibrous material while the same contains at least 45% of water based on the dry wt. of the fibers, to currents of air heated to temps. between 120° C. and 160° C. to volatilize mineral oil and some of the water of the fibrous material, treatment being continued until the water content of the fibrous material is approx. 30%, then subjecting the fibrous material to air currents heated to approx. 90° C. to 120° C. until the water content of the fibrous material is reduced to about 15%, and then further drying the fibrous material at temps. well below the boiling point of water to reduce the moisture content thereof.

Process for recovering waste cooking oils.

McColm, W. L. 2,558,869, July 3, 1951.

A method of reclaiming cooking oil from waste fried potato products comprising passing hot water through a mass of fried potatoes to soften and carry off oil from the potatoes, delivering intermingled oil and water to a settling zone and sepg. the oil from the water by flotation, delivering the sepd. oil and any residual water therein to a mixing zone, heating and agitating the oil at a temp. of 220°-230°F. to drive off any remaining moisture, mixing filtering clay with the heated oil during the agitation, and passing the heated oil through a filter and removing the clarified oil from the filter cake.

Process of extracting sesamin from sesame oil.

Feinstein, L., and Ringel, S. J. 2,557,956, June 26, 1951.

The process of obtaining sesamin from sesame oil comprising extg. sesame oil by contacting it with several volumes of a normally liquid paraffin hydrocarbon solvent for the oil of sesame, solvent being one which boils at no higher than about 75° C. the extn. being carried out at a temp. no higher than 0° C. and above the congealing point of the oil of sesame, sepg. the crude sesamin ppt. from the sesame oil-hydrocarbon soln.

Tall oil separation process.

Davis, J. W., and Spurlin, H. M. Assignors to Hercules Powder Company. 2,558,543, June 26, 1951.

In a process of treating mixts. of resin and fatty acid components for sepn. there-between, the steps comprising passing mixt. into a water-immiscible org. solvent and an alk. aq. medium in amt. to partially neutralize the acid mixt. and having a preferential solvent action for fatty acid soaps in countercurrent flow, and recovering therefrom an org. solvent soln. contg predominantly the resin acids of the mixt. and an aq. soln. contg. predominantly soaps of the fatty acids of the mixt.

Feed for carnivorous animals and methods of making the same.

Kelly, W. H., Jr., and Kelly, J. R. 2,558,092, June 26, 1951.

A feed for carnivorous animals comprising individually compact frangible moist pellets, each consisting essentially of about equal parts of ground fresh meat and dry cereal intimately intermixed and contg. as the moisture content substantially only the natural fluids of the fresh meat.

Raw fish treating process.

Trudel, M. 2,560,011, July 10, 1951.

A process for the production of fish meal from raw fish material contg. gelatin, comprising the steps of adding water to the fish material, adjusting the pH between 3.0 and 3.5 digesting the resultant mixt. at a temp. between 50° and 80° C. filtering the solid residue.

Method for filleting fish.

Leuschner, K. A. Assignor to H. A. Irving. 2,552,984, May 15, 1951.

A method of prepg. fish fillets from a whole fish having a head, tail and entrails comprising removing the head and tail from the fish, removing the entrails through the head end of the fish to leave the belly portion of the fish uncut and empty,

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Abstracts

forcing together opposite sides of the fish to close the empty belly cavity in the fish and confine the bone structure and belly walls of the fish to a region substantially the width of the spine and while the belly is so closed, cutting the fish on each side thereof in two parallel planes each substantially parallel to the fish spine and normal to a minor transverse axis of the fish, the cuts made along said planes being sepd. by substantially only the width of the spine of the fish to sever a fillet from each fish side.

Apparatus for filleting fish.

LEUSCHNER, K. A. Assignor to H. A. Irving. 2,552,985, May 15, 1951.

In a fish fillet machine; a first pair of circular knives each having an inside and an outside face, means supporting a first pair of knives in a parallel spaced relation for rotation in one direction about a common axis, the knives of first pair being of substantially the same diam. and closely adjacent to one another; a second pair of knives; means supporting second pair of knives in a parallel spaced relation for rotation about a common axis, the knives of second pair being of substantially the same diam. and being parallel to first pair of knives, each knife in second pair overlapping in a face-to-face abutment only the inside face on one of first pair of knives; means assocd. with last-mentioned support means for rotating second pair of knives simultaneously with the first pair of knives but in a direction opposite to one direction; and means operatively assocd. with pairs of knives for feeding a fish into two pairs of knives during rotation thereof for cutting by the overlapping portion of knives.

Fish eviscerating machine.

DANIELSON, P. Assignor to Arenco Aktiebolag. 2,558,608, June 26, 1951.

In a fish eviscerating machine, a rotary eviscerating member, a rotary eviscerating roller disposed adjacent and oppositely to member, means disposed adjacent roller for feeding the fish laterally in a direction longitudinally of roller, and means connected with roller for rotating roller to coact with member and pull the entrails out of the open head end of the laterally advancing fish, roller having deep and wide grooves forming cavities adapted to receive thick or expanding portions of the entrails passing between roller and member, grooves extending longitudinally of roller from the one of its ends that is directed in a direction opposite to the fish feeding direction and terminating at a distance from the other end of the roller, roller having also narrow corrugations extending longitudinally between grooves and other end of roller.

Poultry picking machine.

JOHNSON, G. W. Assignor to Gordon Johnson Co. 2,560,524, July 10, 1951.

A poultry picking machine comprising a vertically adjustable base, two upright frames carried by base, a drum carried by each of frames and adapted to rotate, means for rotating drums in opposite directions, a plurality of resilient picking fingers carried pivotally on the peripheries of drums, a suitable conveyor system for passing the fowls to be picked between picking drums, and means including guides carried rigidly by frames and cooperating with the fowl supporting means to oscillate each of fowls about a vertical axis.

Device for folding the legs of an eviscerated bird.

BELL, L. J. 2,560,067, July 10, 1951.

An app. for handling an eviscerated bird having rearwardly outstretched legs comprising, a carrier to support the carcass of eviscerated bird, leg receeiving means to receive the ends of the bird's rearwardly stretched legs which have been truncated adjacent the hock joints thereof, carrier and leg receiving means supported for relative movement toward and away from one another, and driving means assocd. with at least one of the foregoing named elements to cause forcible relative movement between carrier and leg receiving means toward one another whereby the legs of the bird are moved toward the carcass and are bent at their stifle and thigh joints and folded to a hunched position against the carcass of the bird.

Fruit juice machine.

ELTERMAN, A., AND PESHKIN, H. P. 2,560,096, July 10, 1951.

A fruit juice extg. machine comprising a supporting frame, a fruit supporting guide on frame, a spring pressed first pressure plate rockably mounted on frame, a second pressure plate cooperating with first pressure plate for crushing a fruit therebetween and slidable along guide, means operatively connected to second pressure plate for effecting reciprocation of latter pressure plate along guide, second pressure plate being adapted to push a fruit therebefore during a portion of the reciprocation thereof, a spring pressed strainer support pivotally mounted on frame below first pressure plate, a lost motion link connection between strainer support and reciprocable pressure plate for rocking strainer support as latter pressure plate approaches one end of its reciprocating cycle, a vertically disposed cutting blade slidably depending from frame between first and second pressure plates, and means for vertically reciprocating blade, first and second pressure plates being formed with vertical slots therein adapted to receive blade whereby a fruit will be sliced by blade prior to being crushed.

Apparatus for sectionizing citrus fruit.

POLK, R., SR., AND POLK, R., JR. Assignors to The Polk Development Co. 2,560,128, July 10, 1951.

In app. for severing radial section walls from the meat of citrus fruit sections, app. including an elongated rotary rod of relatively small diam. and a movable support therefor journalling the rod adjacent one end thereof for rotation and for moving the rod from an initial position penetrating a fruit section closely within the apex of the radial walls of the section generally radially outwardly along a radial wall through the periphery of the section to break the bond between the wall and meat of the section, the improvement comprising an elongated non-rotary tine, a support therefor mounting the tine parallel with the rod and contiguous thereto in initial position as the rod is moved outwardly, and the free end of rod being extended beyond the corresponding end of the tine whereby the rod penetrates the fruit section in advance of the tine and opens a path through the section adjacent thereto to facilitate penetration by the tine.

Apparatus for sectionizing citrus fruit.

POLK, R., SR., AND POLK, R., JR. Assignors to The Polk Development Company. 2,558,579, June 26, 1951.

In app. for sectionizing citrus fruit including a holding fork having a circular series of parallel tines adapted to penetrate a peeled fruit polarwise within the apices of section walls thereof, a circular series of composite sectionizing tools in coaxial alignment with series of tines, each tool comprising a relatively thin flat blade of a width in excess of the radial dimension of a fruit section and having a straight longitudinal edge parallel with the series of tines and arranged in a circle of slightly larger diam. than series and with the planes of the blades extending generally radially from the axis of the series and each blade having a rod member of relatively small diam. connected resp. therewith and forming a substantially straight line continuation of edge, each rod having a length extending from the blade in excess of the fruit diam., a tool supporting head positioned above said tines, a circular series of brackets, each bracket composed of a shank portion connected with the head and a radially offset portion of inverted L-shape connected with the upper end of the blade and rod member of each tool respectively, the shank portion being substantially in axial alignment with rod member and the extremity of the offset connected adjacent the outer edge of the blade, and means for moving relatively the head and holding fork first axially to pass the blades completely through a corresponding no. of sections of a fruit held on the fork to slit the meat of the sections from one radial wall thereof and position rod members in the slits and then rotationally to engage the rod members with the radial walls to wrap the radial walls spirally about the series of tines to strip the meats from the remaining radial walls.

Vegetable treatment process.

PEEBLES, D. D., CLARY, P. D., JR., AND MEADE, R. K. Assignors to Western Condensing Co. 2,559,459, July 3, 1951.

In a process for the treatment of fresh vegetable material, expelling a substantial amt. of juice from the material by apply-

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DIAMOND CRYSTAL Antioxidant SALT

Abstracts

ing pressure to the same, coagulating vegetable protein contd. in the juice by acidulating and heating the same and then removing moisture from the coagulated protein and juice to form a marketable product.

Method for preparing and canning cabbages.

MARINKOVICH, M. 2,559,081, July 3, 1951.

A method for preparing cabbage which comprises scalding the cabbage until the leaves thereof are softened, sepg. the leaves and soaking the same in brine maintained at substantially uniformly warm temp. for several days until the leaves are substantially tender but solid, removing the thickened stock portions of the leaves to render the same more readily foldable, folding the individual leaves upon themselves until they are compact enough to be readily received in a preserving can, packing folded leaves in preserving cans, adding the brine used for soaking to the cans, and vacuum sealing cans.

Low methoxyl acid pectinate jelly composition.

BARCH, W. E. Assignor to Sandard Brands Inc. 2,559,338, July 3, 1951.

A gel forming compn. comprising particles of a low methoxyl acid pectinate capable of forming clear homogeneous gels with calcium ions and discrete particles comprising an edible water-sol. calcium salt and an edible water sol. acid, the rate of soln. in water of the latter particles being lower than that of the pectinate particles, the amt. of the calcium salt being sufficient to gel the pectinate without substantial ppn. of calcium pectinate when the compn. is dissolved in water and the amt. of acid being sufficient to provide a soln. pH between 3 and 7.

Undenatured gelatin hemostatic sponge containing thrombin.

STUDER, A. Assignor to Hoffman-La Roche Inc. 2,558,395, June 26, 1951.

As a ready-to-use hemostatic sponge, a freeze-dried foam of an aq. soln. contg. undenatured water-soluble gelatin and thrombin.

Dry infant food.

LOLKEMA, J. Assignor to Naamlooze Vennootschap: W. A. Scholten's Chemische Fabrieken. 2,559,022, July 3, 1951.

A dry infant food comprising milk powder, dextrin-maltose, a solid org. acid in a proportion sufficient to coagulate the casein of the milk powder when the prepn. is dissolved in water and approx. 10% of a cold swelling flour taken from the class consisting of flour which has been mixed with up to an equal amt. of water and pressed in thin layers at a temp. above the gelatinizing temp. of the so-heated flour of about 100° C. and higher, simultaneously drying thin layers and thereafter comminuting such product, and a starch treated with hydrogen peroxide in a neutral medium and thereafter pressed in admixt. with water in thin layers at elevated temps., simultaneously drying thin layers and thereafter comminuting such product.

Process of manufacturing margarine.

HORNCHURCH, A. D. W., AND OAKLEY, H. B. Assignors to Lever Brothers Co. 2,558,204, June 26, 1951.

A process for permanently improving the plasticity of margarine, comprising first heating margarine, then cooling margarine and finally subjecting margarine to mech. working.

Method of blanching nuts.

GREEN, P. Assignor to Seabrook Associates. 2,558,899, July 3, 1951.

A method of blanching peanuts which consists in slitting the skins on the peanuts from end to end of the peanuts, passing the slitted peanuts through a water scalding bath approximating boiling temp. for a period approximating one min., spraying the slitted and scalded peanuts with hot water as they emerge from the bath, and gently rubbing the slitted, scalded and sprayed peanuts to remove the skins without breaking the peanuts.

Nut butters.

HARRIS, B. R., AND JOFFE, M. H. Assignors to The Emulsol Corp. 2,560,509, July 10, 1951.

A method of prepg. nut butters of improved character which comprises thoroughly admixing with a nut butter a minor proportion of a higher mol. wt. fatty acid partial ester of a polyglycerol, maintaining the mixt. at a temp. not substantially below 50° C., and then allowing the mixt. to cool to room temp.

Process for treatment of sugar.

NORTHCUTT, R. T., AND NORTHCUTT, R. T., JR. Assignors to Northcutt Research Corp. 2,558,775, July 3, 1951.

The method of manufg. an essentially non-hygyroscopic solid sugar from sugar cane juice which comprises clarifying juice to deodorize and decolorize the same, concg. juice to approx. a 60% solid content, heating juice in a thin film at a temp. within the approx. range of 275° F. to 375° F. to rapidly dehydrate the same to a moisture content not exceeding approx. 2%, whereby intervening crystn. of any ingredients of the juice is prevented and the dehydrated product is converted to a molten state, solidifying substantially anhydrous molten sugar and grinding the same.

Treatment of sugar process water.

PEARSON, E. A. Assignor to Research Corp. 2,560,125, July 10, 1951.

In the extn. of sugar from beets by diffusion the process of re-utilizing the process waste water for the purpose of further extn. of sugar consisting in the following steps: collecting the process waste water, adding thereto from 20 to 100 p.p.m. of chlorine, controlling the pH of the process waste water and chlorine mixt. between a pH of 5 and 7, sepg. solid matter from the mixt., and reintroducing the mixt. into the diffusion process.

Process of producing a reducing sugar and milk product.

SHARP, P. F. Assignor to Golden State Company, Ltd. 2,558,528, June 26, 1951.

The method of prepg. an edible material adapted for use in prepg. food products such as baked products, ice cream and the like, and of improving the body and consistency thereof, which comprises combining a reducing sugar and the solids of milk into a liquid mixt. and when the total solids content is in excess of 25% by wt. heating the combination to a temp. in excess of 212° F. for a period short of browning of the product.

Demineralization of sucrose solutions by ion exchange.

DAY, H. M., COB, C., AND WROTNOWSKI, A. C., JR. Assignors to American Cyanamid Co. 2,560,504, July 10, 1951.

A process which comprises bringing an aq. soln. contg. sugar into contact with a pair of cation and anion exchangers in that order, cation exchanger having previously been substantially completely activated with ammonium ions and anion exchanger being hydroxyl activated, and sepg. the soln. from exchangers.

Slicing machine with vertically reciprocating cutter.

LEAVENS, R. E. 2,560,229, July 10, 1951.

A slicing machine comprising a base, spaced upstanding guide, rods anchored to the base, a seat supported by, and spaced above, the base between the guide rods, seat being formed of upstanding spaced pins whose upper ends diverge upwardly, sleeves slidable on the guide rods, a yoke whose ends are secured to the sleeves, a blade shank depending from the yoke and secured thereto in axial alignment with the center of seat, the lower end of the shank being provided with slots, an assembly of flat cutter blades including a pilot blade whose outer margins converge downwardly and a series of supplemental blades on each side of the pilot blade the margins of supplemental blades converging to a point which is spaced above the point of the pilot blade, the converging edges of blades being formed into sharp cutting edges, blades being secured in slots with the cutting edges of the blades symmetrically disposed about the axis of the shank in staggered relation to and moveable between pins, and resilient means on guide rods engageable by sleeves for yielding arresting downward movement of blades between pins at a point mediate seat and base.

Hot drink maker and vending machine.

KNAPP, J. H. Assignor by direct and mesne assignments, to C. E. Hovey. 2,558,522, June 26, 1951.

In a hot drink making machine of the character described, a plurality of reservoirs for drink ingredients; a dispensing

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mechanism for each reservoir respectively; an elec. operable actuating element for each dispensing mechanism respectively; a selector switching device having a plurality of fixed contacts, each being elec. connected to a respective one of actuating elements, and a manually manipulable contact plate engageable with each of contacts of two or more simultaneously; a supply circuit having fixed contacts and actuating element interposed therein; and means for closing the supply circuit through contact plate, the fixed contacts engaged thereby, and corresponding actuating elements for dispensing certain of ingredients upon prior selection thereof by manipulation of the contact plate.

Plug drain for solvent extraction plants.

ANDERSON, R. T. Assignor to The V. D. Anderson Co. 2,560,147, July 10, 1951.

Solid material discharge mechanism for a solvent extn. app. having a chambered tower wherein a stream of solvent liquid is caused to rise in a chamber through a falling stream of solid particles and wherein the bottom wall of tower is provided with an aperture through which solid material is discharged, discharge mechanism comprising an imperforate tubular barrel communicating at one end with aperture, the other end of barrel being provided with choke means yieldably biased towards closed position, a rotatable shaft extending axially within and through barrel, worm flights fixed on shaft and arranged to impel through barrel solid material dropping through aperture into the receiving end of barrel, and to increasing compact and discharge material past choke means whenever the material-impelling force arising from screw pressure exceeds the choke-closing bias, a portion of shaft being provided with a longitudinal bore extending from a point adjacent the material discharge end of barrel to a point adjacent receiving end of barrel, the wall surrounding shaft bore adjacent barrel discharge end being provided with liquid inlet means to permit entry into bore of liquid expressed from the compacted material adjacent choke means, the wall surrounding shaft bore adjacent the material-receiving end of barrel being provided with a series of peripherally spaced holes, a length of tube communicating with each hole and extending outwardly into barrel to permit expressed liquid in bore to return to barrel.

Method of treating citrus fruit pulp liquor.

SOKOLOFF, B. T., AND REDD, J. B. 2,559,685, July 10, 1951.

A process for reducing the bitter after-taste of citrus molasses, which comprises adding absolute isoypropyl alc. to the molasses to dissolve the glucosides, agitating the mixt. of molasses and alc., and then removing the alc. from the molasses.

Tea sirup and process for making same.

LINDSEY, M. 2,559,194, July 3, 1951.

A tea syrup comprising, concd. aq. tea ext. in admixture with glucose and sucrose sugars, sugars being present in total amt. from about 8.3 to about 10.7 lbs. per gallon of ext., and the ratio of glucose to sucrose being within a range of about 3 parts glucose to 5 parts sucrose through about 5 parts glucose to 3 parts sucrose.

Apparatus for processing foods.

REICH, G. T. 2,558,268, June 26, 1951.

In app. for processing fluent foods contg. suspended solids, a tank, and a rotatable agitator in tank, agitator comprising a horizontal shaft and a plurality of substantially radially disposed sheet-like agitator blades carried by shaft, each of sheet-like agitator blades being in substantial contact with the shaft along a line extending for a substantial distance in the axial direction of the shaft, blades having continuous surfaces extending outwardly from the shaft to the outer ends of the blades, the outer ends of blades being slotted to provide a plurality of longitudinally spaced, substantially parallel, flat fingers, fingers being curved in the direction of rotation of shaft.

Method of freeze dehydration of liquid bearing substances.

WENZELBERGER, E. P. Assignor to The Commonwealth Engineering Co. 2,559,204, July 3, 1951.

In a method of dehydration, moving a liquid bearing solids by stages through progressive stages of lowering temp., applying a refrigerant at each stage at a differential of temp. between the refrigerant and the initial freezing temp. of the liquid at the respective stages that is approx. the same at each stage, establishing the temp. at each stage at an amt. lower than the preceding stage approx. equal to differential, and removing from the liquid the solvent crystals formed in each stage before passing the liquid bearing the solids to the next stage.

Method of cooking food.

FINIZIE, T. Assignor to E. J. Finizie. 2,558,294, June 26, 1951.

The method of cooking an article of food which comprises disposing the article in a cooking chamber having an outlet or vent located above the article, creating a curtain of vapor moving upwardly within the chamber over the article and to the vent, and applying radiant heat to the article through the curtain.

Spray drier.

NYROP, J. E. 2,559,989, July 10, 1951.

In an app. for drying a mass of liquefied material, the combination of a closed chamber provided at its lower portion with a discharge duct; a pipe passed through the top of chamber and disposed co-axially of chamber; an atomizer on the end of pipe and disposed in the upper portion of chamber; a second pipe passed through the wall of chamber and having its terminal portion in chamber disposed co-axially with first pipe; a nozzle on the end of terminal portion and disposed closely adjacent atomizer; a discharge conduit passed through the wall of chamber and having an annular intake portion disposed about the lower end of terminal portion; and a supply conduit passed through the wall of chamber, connected with discharge conduit and having its discharge end in chamber disposed normal to terminal portion and intermediate nozzle and annular intake portion.

Preparation of d-tartaric acid.

LOCKWOOD, L. B., AND NELSON, G. E. N. Assignors to the U. S. A. 2,559,650, July 10, 1951.

A process for the production of d-tartaric acid which comprises inoculating an aq. nutrient soln. contg. a source of assimilable nitrogen and potassum salt of 5-keto-d-gluconic acid with *Pseudomonas fluorescens*, cultivating the bacteria under submerged aerobic conditions at a pH within the range of 4 and 8 and at a temp. within the range of 20° and 40° C. for a period of 3 to 17 days, adding sufficient acidic ion to ppt. the tartaric acid as potassium hydrogen tartrate.

Frozen food package.

WOOL, F. A. 2,559,101, July 3, 1951.

A frozen food package comprising a tubular open-ended body of frozen food, a tubular outer member surrounding body and against which the outer surface of body is supported, a tubular open-ended inner member concentric with body and outer member extending centrally through body and supporting the same thereon, coaxial centrally apertured heads at opposite ends of body extending between the corresponding end edges of outer and inner members and respectively secured to members, one of heads being slidably supported within outer member for movement axially of the latter through the same to the opposite end of body when the other head at opposite end is removed.

USE OF DRY- AND BRINE-FROZEN HERRING AS BAIT

Further tests by the Norwegian Fisheries Research Laboratory have confirmed earlier experiments on the use of frozen herring for bait. Herring frozen dry, as compared with similar herring frozen in brine, demonstrated a much greater ability to catch fish. The tests were carried out in a number of fishing areas under actual fishing conditions. Dry-frozen herring treated with ascorbic acid gave the same results as untreated herring, according to a report issued by the Norwegian Directorate of Fisheries. [From *Fisheries Review*, 17 (7) 45 (1951).]

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NEW FOOD PROCESSING FELLOWSHIP AT THE ILLINOIS INSTITUTE OF TECHNOLOGY

The Illinois Institute of Technology and the Putman Publishing Company, both of Chicago, announced the establishment of a fellowship for the advancement of the sciences in the industrial processing of foods, sponsored by the magazine *Food Processing*.

This fellowship of $2,000 with $600 for tuition and $1,400 for the fellow, provides for one year of graduate study at the Illinois Institute of Technology, leading to the degree of Master of Science in food engineering. The fellow will engage in a research project of fundamental importance in the advancement of the sciences and the profession. It is anticipated that this fellowship may be continued as three years of graduate study, leading to a Doctorate.

In founding this fellowship, the Putman Publishing Company, also publishers of *Chemical Processing*, pays tribute to Professor Emeritus Harry McCormack who for 38 years was Director of the Department of Chemical Engineering at Illinois Institute of Technology. Professor McCormack has served the Putman Publishing Company as Technical Consultant and Adviser for many years.

This is the first fellowship ever established for the advancement of food engineering as a profession, in the processing, handling and distribution of foods. IIT's graduate study program in food engineering is under the supervision of Dr. L. A. H. Harvey, Professor of Food Engineering and Director of Industry Sponsored Research. This program has been developed and carried on with the counsel and advice of the IIT Food Technology Council, a Board of more than 25 leaders in food industries throughout the nation. Professor M. E. Parker, Director of Food Engineering, will have immediate charge of this fellowship.

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By using soft metal solders, it is possible to subject this glass-to-metal seal to rapid temperature changes without danger of cracking, despite the wide difference in temperature expansions between glass and metal. This is possible because the differences in movement are absorbed by the solder, it was explained.

The new technique is already in use in aircraft ignition systems and is possible in many other applications. [From *Aminco Laboratory News*, 8 (4) 3 (1951).]

PACK OF MAINE SARDINES (INCLUDING SEA HERRING), 1950

Maine sardines (including sea herring) packed in 1950 amounted to 3,844,164 standard cases, valued at $21,209,033 to the packers. Compared with the previous year, this was an increase of 25% in quantity, but less than 1% in value.

The average price per standard case at the canners' level dropped from $6.85 in 1949 to $5.52 in 1950. The 1950 price is the lowest since 1946. Sardines in soybean or other vegetable oil in 1950 (the bulk of the pack was put up in this style) averaged $5.43 per standard case, compared with $6.95 in 1949. The next important style pack was sardines in mustard sauce which averaged $5.33 per standard case in 1950, compared with $7.08 in 1949. [From *Com. Fisheries Rev.*, 13 (6) 45 (1951).]

NEW MARINE RESEARCH INSTITUTE ORGANIZED

A new marine research institute has been formed in the Woods Hole, Mass. area, already famous for its marine laboratories. The new institute, the Marine and Fisheries Engineering Research Institute, was incorporated as a non-profit organization and was founded to fill a gap between the marine research performed by scientific organizations and the practical engineering aspects required by the fishing industry and other industries with marine problems. The formation and organization of the Institute became possible through the initial financial support of the Friendship Fund, Incorporated, of New York, N. Y., according to an April 6, 1951, news release from the Institute.

Columbus O'D. Iselin, senior oceanographer and former director of the Woods Hole Oceanographic Institution, was named president of the new organization, while Francis Minot, Maritime Consultant of Cotuit, Mass., became vice-president and director.

The Marine and Fisheries Engineering Research Institute will "promote the advancement of the fishing industry; oceanography and other marine sciences and industries; and the exploitation of the food and other resources of the oceans and other bodies of water." This will be done through research, and the development and testing of tools and techniques, including but not limited to vessels, propulsion systems, equipment, fishing gear, fishing and marine-planting methods, and marine life. [From *Com. Fisheries Rev.*, 13 (6) 41 (1051).]

EMPLOYMENT NOTICES

WANTED: Canning Technologist, B.S. degree. Several years citrus experience desirable. For technical sales work in Florida. Advise training, experience, salary, etc. REPLY BOX 175, Institute of Food Technologists, 176 W. Adams St., Chicago 3, Ill.

TECHNICAL SERVICE MAN (New York) to act as liaison representative between research and sales executives. Prefer Ph.D. in nutrition, biochemistry, or food technology. Broad technical and personal contact experience in nutrition or food processing field. Submit detailed resume of training and experience in first letter. Excellent opportunity with nationally known company. BOX 180, Institute of Food Technologists, 176 W. Adams St., Chicago 3, Ill.

AVAILABLE: In a few months I will be retired by a large food processing company. I am in perfect health with many years experience in research and production engineering. Two degrees. An opportunity to secure a man with creative ability to develop new processes, new products and new machines. My patents have made large sums for our firm. Best references from the highest executives. REPLY BOX 177, Institute of Food Technologists, 176 W. Adams St., Chicago 3, Ill.

PRODUCT DEVELOPMENT GROUP LEADER to supervise food research unit in nationally known company. Must have broad experience in chemistry, food technology, or engineering. Be able to plan and coordinate research program, allocate assignments and direct work of technical personnel. Successful record of new product development desirable. Submit detailed resume of training and experience in first letter. Excellent opportunity. BOX 181, Institute of Food Technologists, 176 W. Adams St., Chicago 3, Ill.

POSITION WANTED: Food Technologist, M.Ch.E., 4 years quality control and product development in sugars, syrups, sauces, baked goods and dietetic foods. Desires position in research or process development in Metropolitan New York area. REPLY BOX 178, Institute of Food Technologists, 176 W. Adams Street, Chicago 3, Ill.

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WAREHOUSE SERVICE PROGRAM

A new commercial warehouse program to provide short-term and in-transit storage service to meet requirements of the military has been inaugurated by the Defense Department. Field offices have been established throughout the country to make surveys and conduct preliminary negotiations with public warehousemen. For details see Defense Dept. *Military Production News*, No. 13 (1951).

U. S. AND ALASKA PACK OF CANNED SALMON, 1950

Canned salmon packed in the Pacific Coast States and Alaska in 1950 amounted to 4,274,462 standard cases, valued at $108,590,571 to the canners. Compared with 1949, this was a decrease of 23 percent in quality, but an increase of 5 percent in value. The Alaskan production accounted for 77 percent of the total 1950 pack. Canned pink salmon was only 34 percent of the 1949 production due to a combination of poor runs in Southwestern Alaska and the fact that practically no pink salmon are caught in Puget Sound during the even-numbered years.

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WEST COAST PACKER *Cuts* PEELING *Costs*

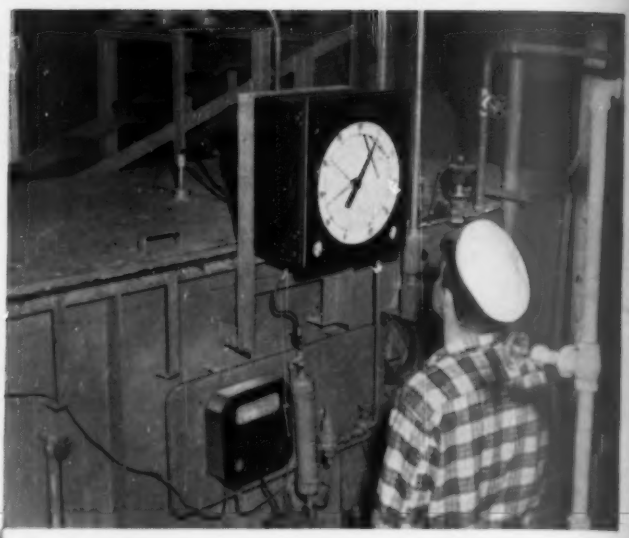

Photo courtesy Gerber Food Products, Oakland, Calif.

Photo courtesy Manteca Packing Co., Manteca, Calif.

LAST YEAR, Manteca Packing Co. of Manteca, Calif., installed a Brown Lye Peeler Control System. Now, a year later, it has already paid for itself several times over . . . and is still continuing to give results that far surpass their original expectations.

Brown Lye Peeler Control Systems are being used on peaches, apricots, plums, sweet potatoes, carrots, beets and potatoes. If you'd like to find out more about automatic controls for your caustic peeler, write for Data Sheet 3.2-6 today.

Other canners throughout the country have tried Brown automatic caustic control and all of them report:

- *Less losses from over-peeling.*
- *Less need for hand-peeling.*
- *Better-looking peeled fruits and vegetables.*
- *Lower lye consumption.*
- *Elimination of constant supervision and manual adjustment.*

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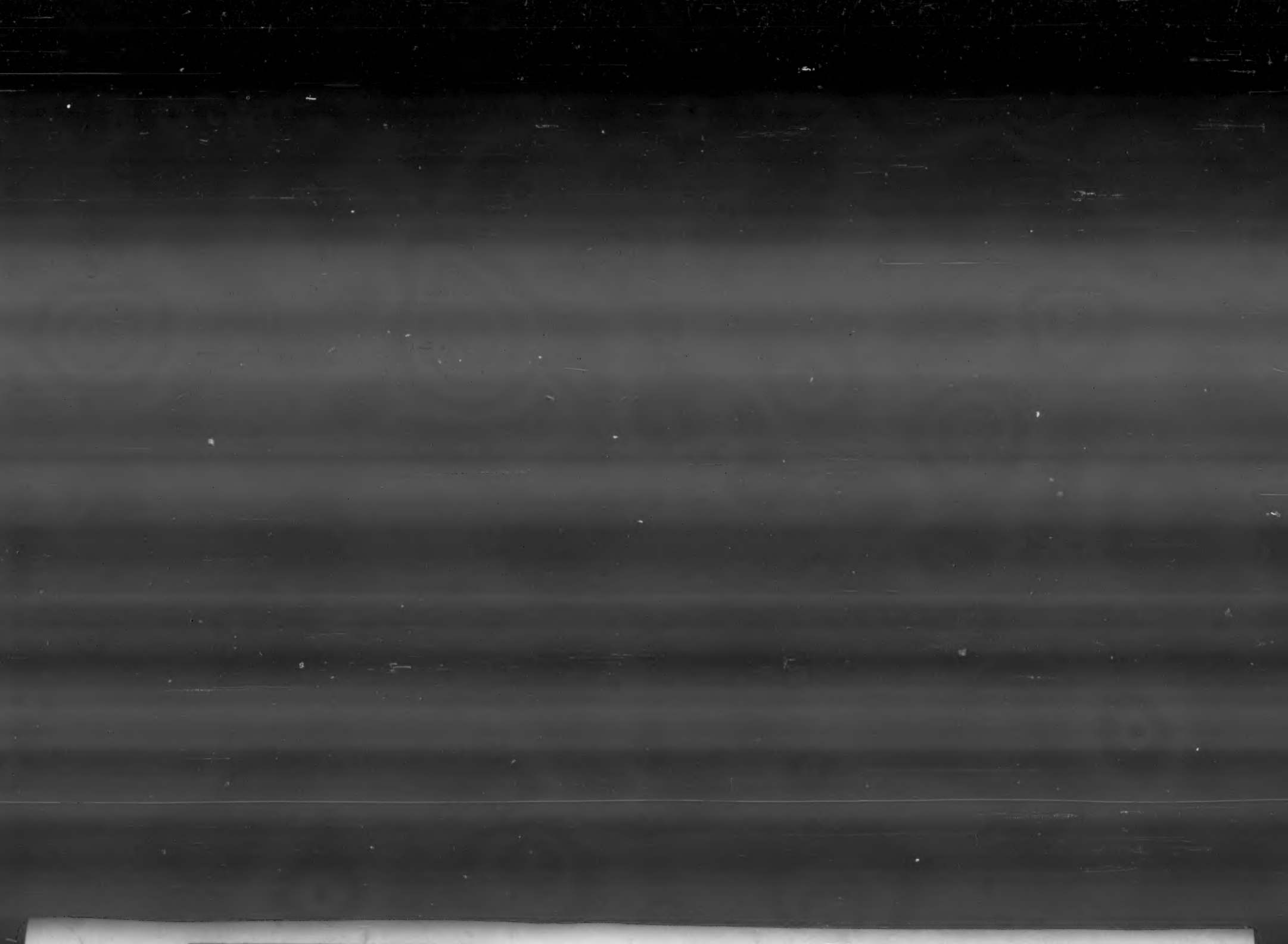

and making a similar product. The drier was of the same type, but was 20 feet long and 5 feet in diameter. Steam-heated air was used as the drying agent. The hot air entered the drier at 330° F. and left it at 160° F. The estimated time of passage through the drier was 45 minutes. The average moisture content was below 3%. Samples were taken in the same way as before. Table 7 shows a mean difference in grade of 2.5% in favor of the laboratory drier. Comparison with Table 6 shows that the mean grades obtained with the laboratory drier were essentially the same in both cases, as would be expected from the similarity of the raw material. The difference in grade of the commercially dried samples must therefore be due to the difference in drying methods. The mean difference in Table 7, although less than half as great as that in Table 6, is still statistically significant. It may be concluded that both of these commercial driers gave pomace of somewhat less than the maximum possible grade, and that the direct fired drier gave somewhat lower grades and more variation. Probably these differences reflect only the differences in operating temperatures between the 2 driers, and have nothing to do with the use of flue gas or heated air *per se*.

TABLE 7

Grades of pomace samples. Comparison of laboratory drier with commercial steam-heated rotolouvre drier

Pair number	Grade of pomace dried in		Difference
	Laboratory drier	Commercial drier	
1	36.7	33.7	3.0
2	39.7	34.6	5.1
3	37.8	35.8	2.0
4	36.0	34.4	1.6
5	38.1	34.8	3.3
6	33.7	34.0	—0.3
Mean	37.0	34.5	2.5[f]

[f] Significant at 5% level.

The third plant was making apple sauce from a mixture of varieties, with Rhode Island Greening predominating. The peels and cores were ground and pressed only once. The drier was a rotary steam-tube type, using steam at a pressure of 40 pounds per sq. inch. The temperature within the drier was not recorded. The estimated time of passage through the drier was one hour. It was observed that some of the wet pomace stuck to the tubes and was scorched. This was probably due to the high moisture content of the single-pressed pomace. The average moisture content of the product was about 7%. The data, shown in Table 8, indicate a mean difference of 7.7 points in favor of the laboratory drier. Since the raw material and the process were obviously quite different from those in the other plants, no comparisons can fairly be made between the relative merits of the steam tube drier and the Rotolouvre driers. It can only be stated that under the circumstances here described the differences in grade, in favor of the laboratory drier, were quite marked and highly significant. This pomace, as may easily be guessed, could be disposed of only as stock feed.

It should be observed here that in commercial pomace drying, accurate control of temperature and an even flow of material into the drier are essential for the maintenance of a good pomace grade. Carelessness in attention to these details sometimes results in obvious scorching, and probably even more frequently in damage which, although not visible, is reflected in lowered grade.

TABLE 8

Grades of pomace samples. Comparison of laboratory drier with commercial rotary steam-tube drier

Pair number	Grade of pomace dried in		Difference
	Laboratory drier	Commercial drier	
1	28.7	24.5	4.2
2	29.7	18.2	11.5
3	24.0	18.5	5.5
4	23.8	19.6	4.2
5	26.2	15.8	10.4
6	24.4	13.9	10.5
Mean	26.1	18.4	7.7[g]

[g] Significant at 1% level.

SUMMARY

Apple pomace may be dried in a laboratory drier at 90° C. (194° F.) with maximum retention of grade. Pomace from apples kept in cold storage shows, in most cases, no marked change in grade, when only sound tissue is used, until the approach of complete deterioration. The inclusion of rotten tissue lowers the grade. Pomace which is allowed to stand at room temperature before drying loses about 40% in grade after one day and about 50% after 2 days; after 3 days it is too low to test, indicating a loss of more than 60%. The pomace from peels and cores is from 25 to 70% higher in grade than that from the peeled and cored apples. Pomace dried in commercial driers is lower in grade than that from the same apples dried in a laboratory drier, the differences being slight in some cases, although statistically significant.

Acknowledgments

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